Appendix A
Slapjack Project Maps

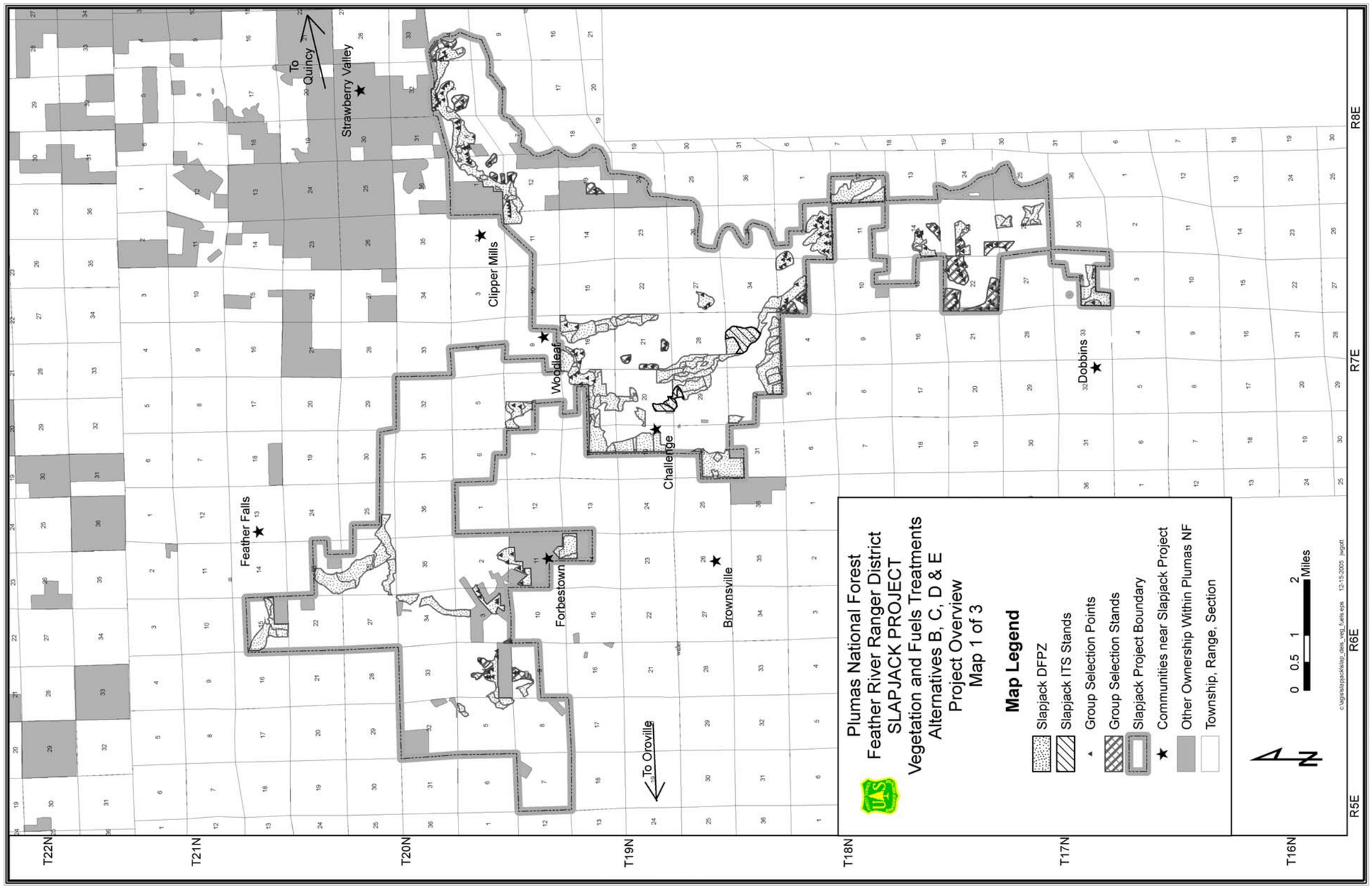

Figure A-1a. Slapjack Project vegetation and fuels treatments for alternatives B, C, D, and E, project overview.

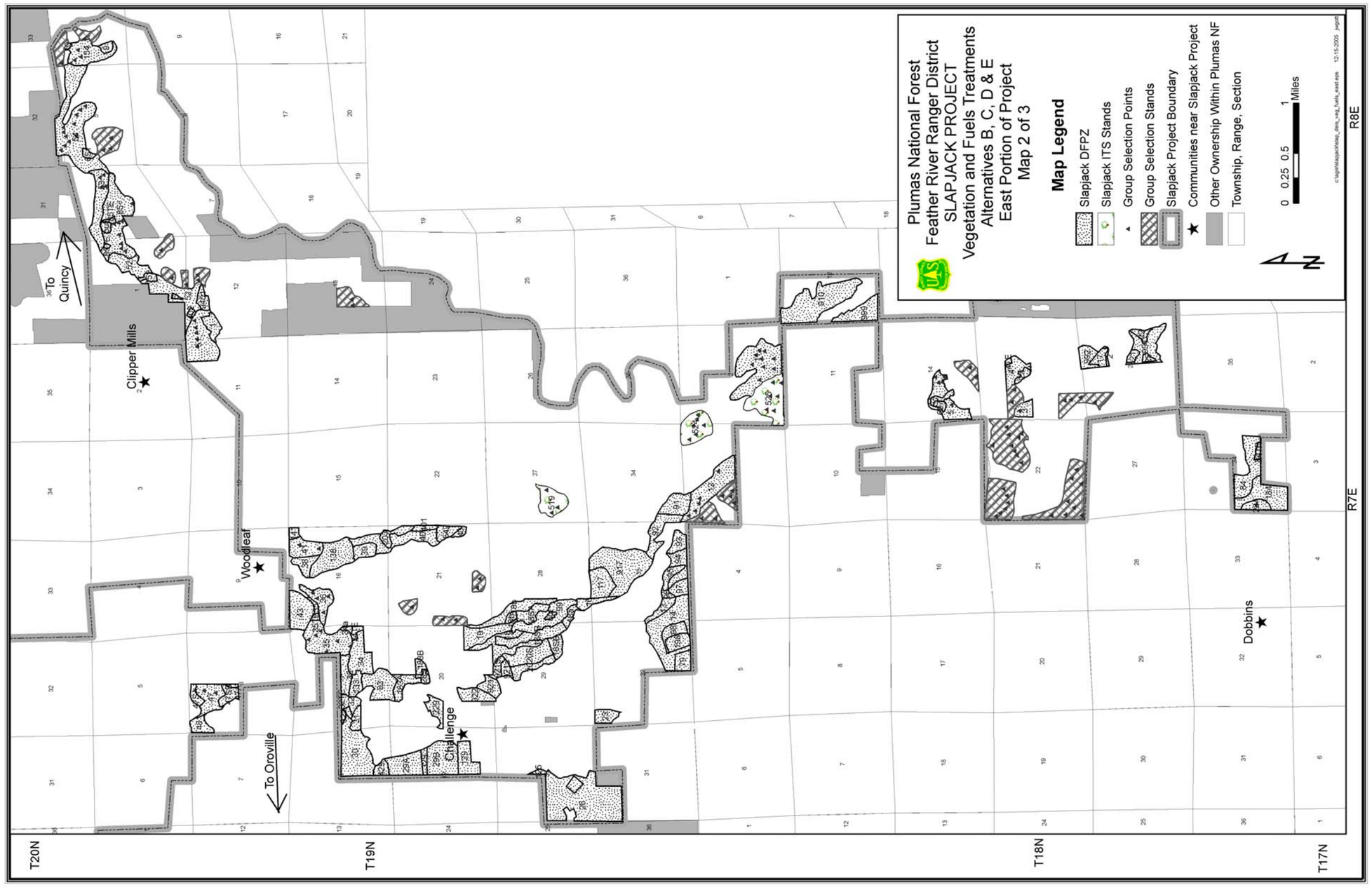

Figure A-1b. Slapjack Project vegetation and fuels treatments for alternatives B, C, D, and E, east portion of the project area.

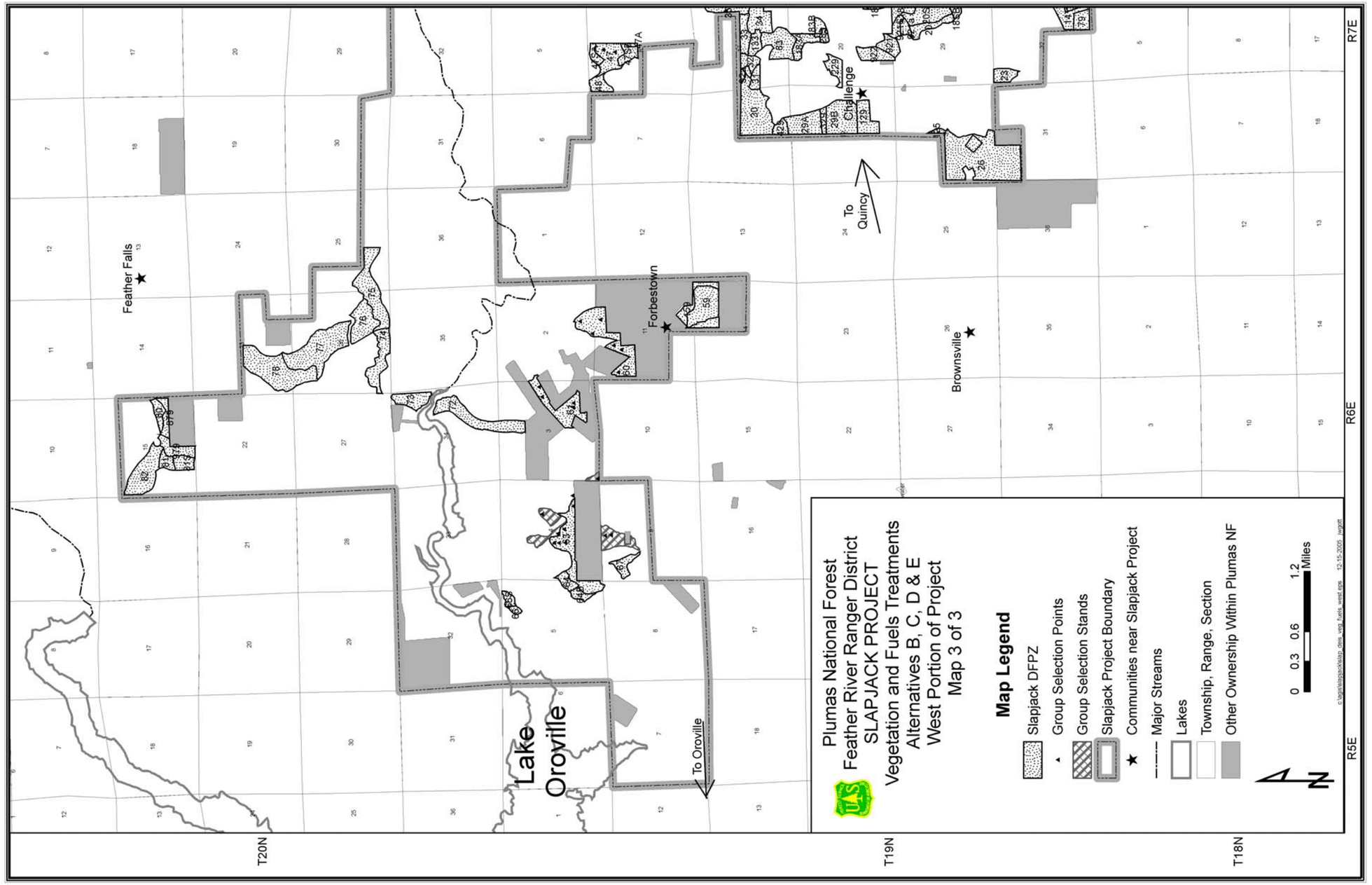

Figure A-1c. Slapjack Project vegetation and fuels treatments for alternatives B, C, D, and E, west portion of the project area.

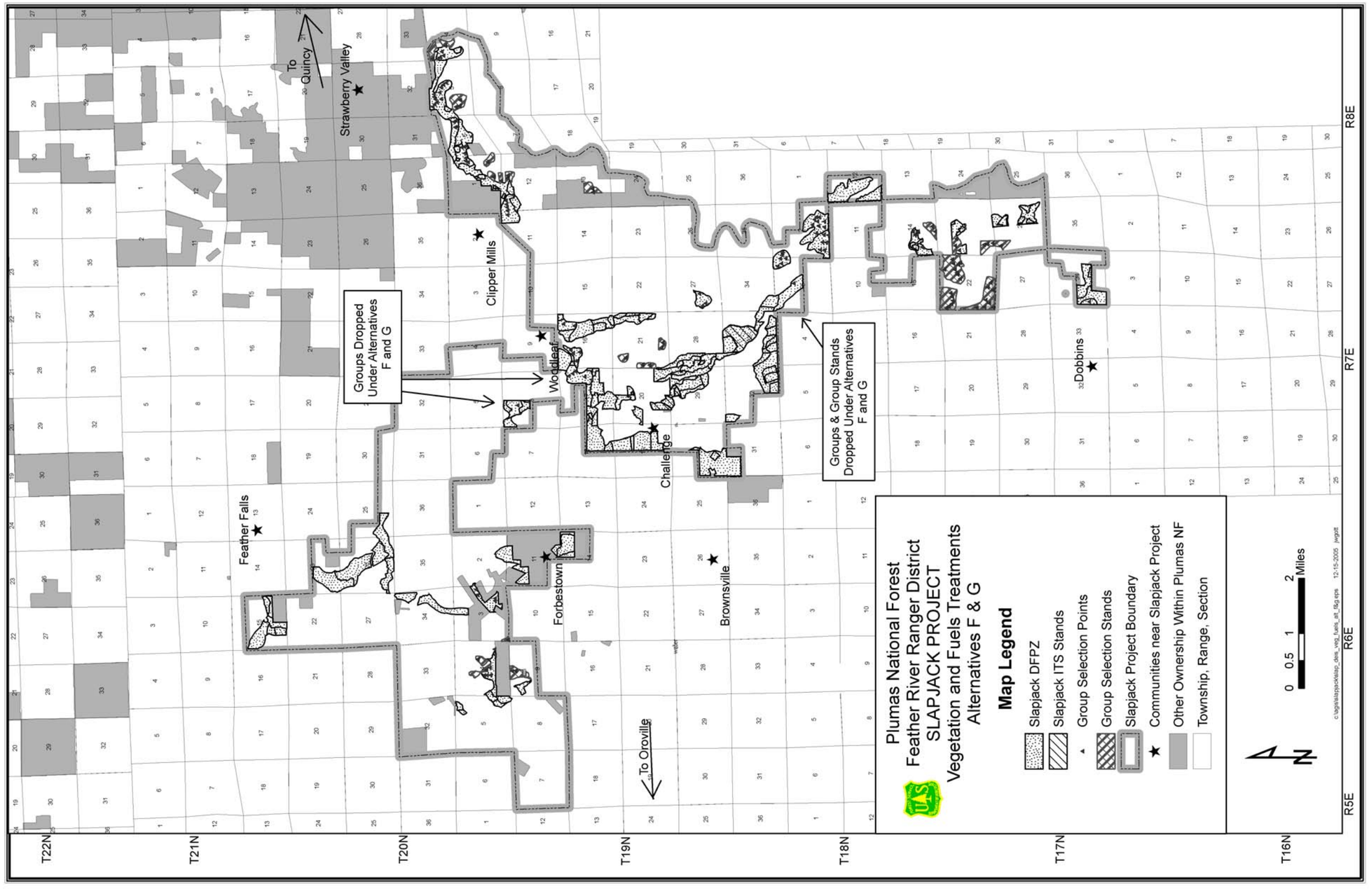

Figure A-1d. Slapjack Project vegetation and fuels treatments for alternatives F and G.

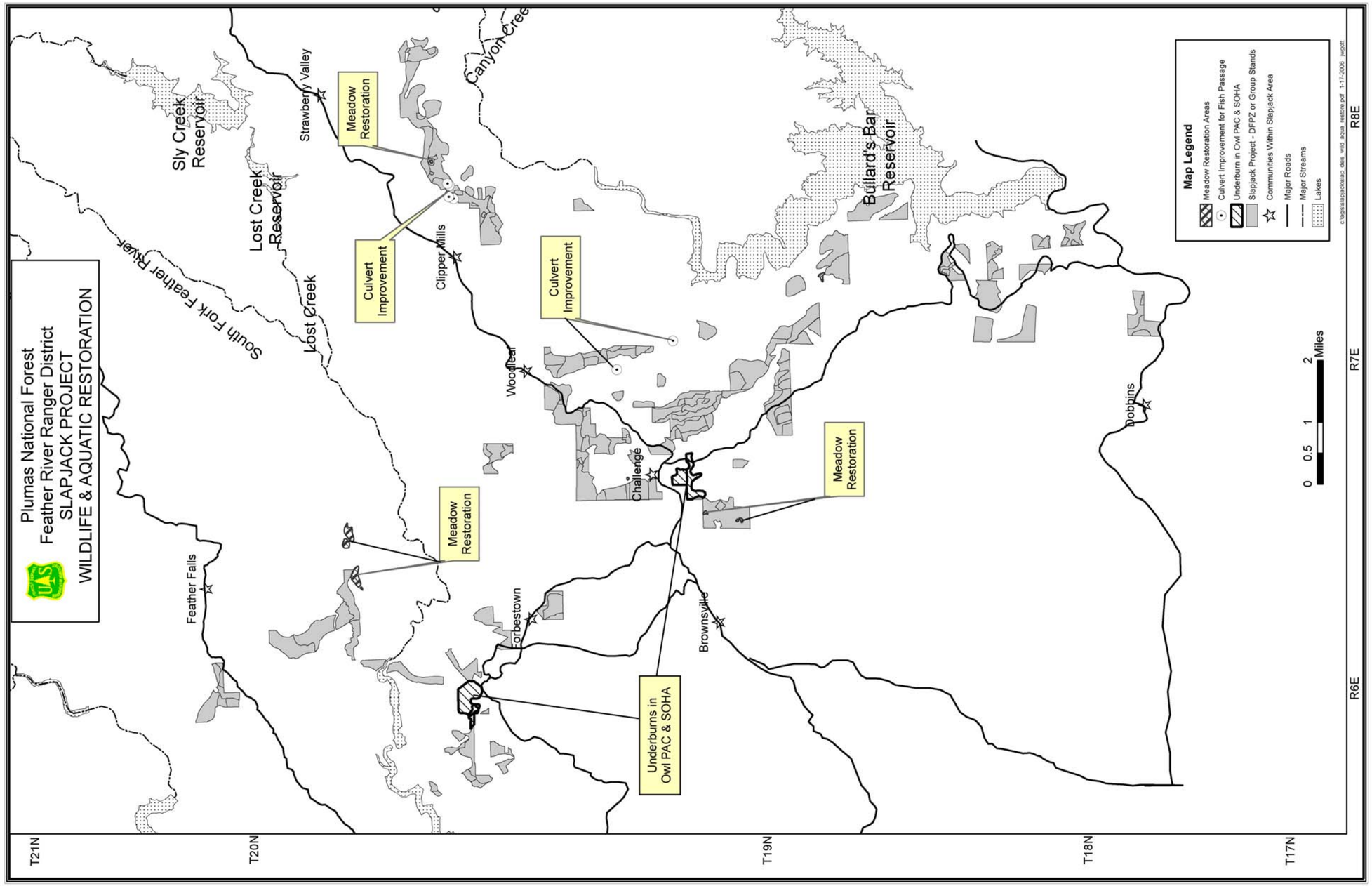

Figure A-1e. Slapjack Project wildlife and aquatic restoration.

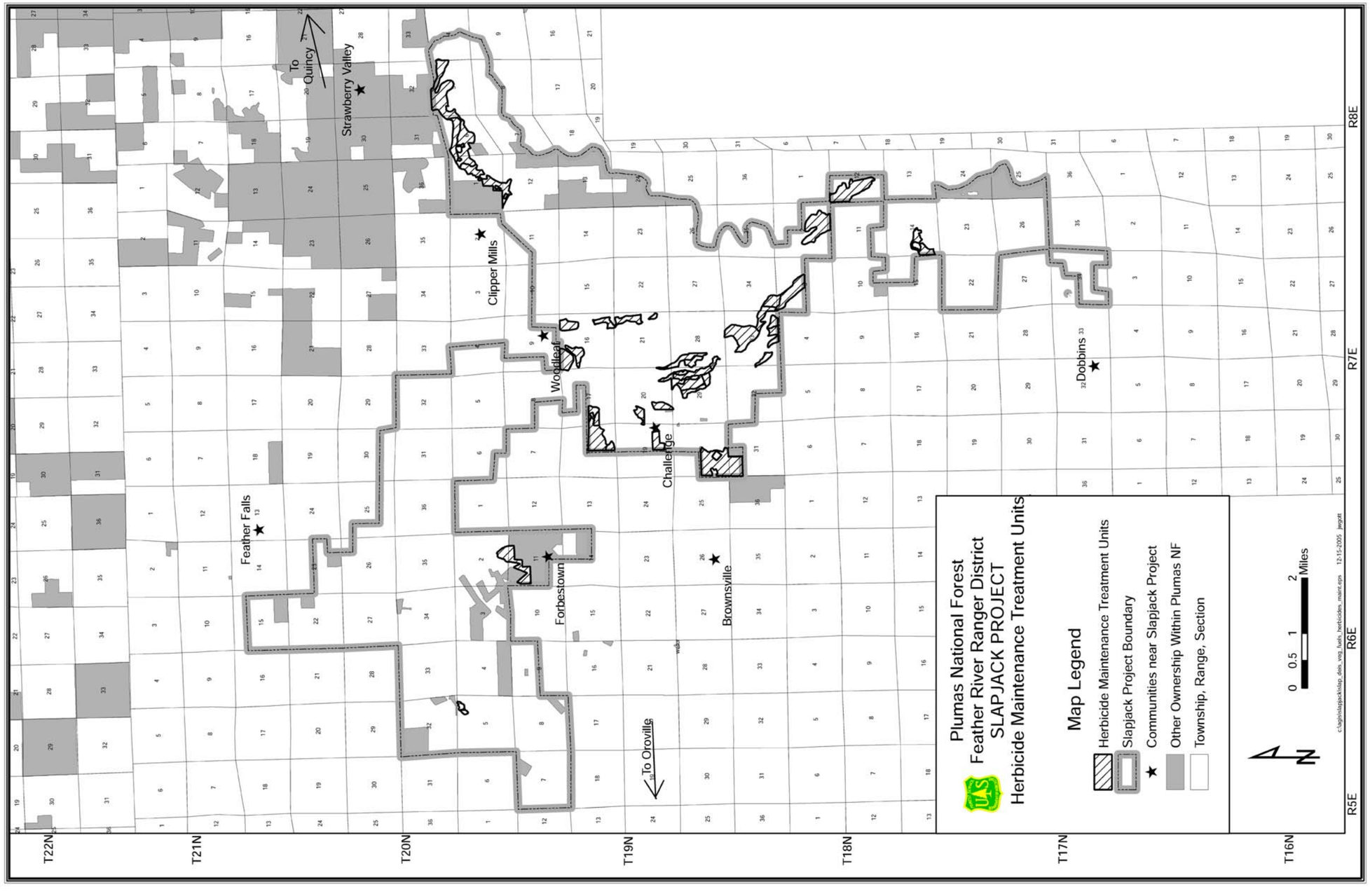

Figure A-2. Slapjack Project herbicide maintenance treatment units.

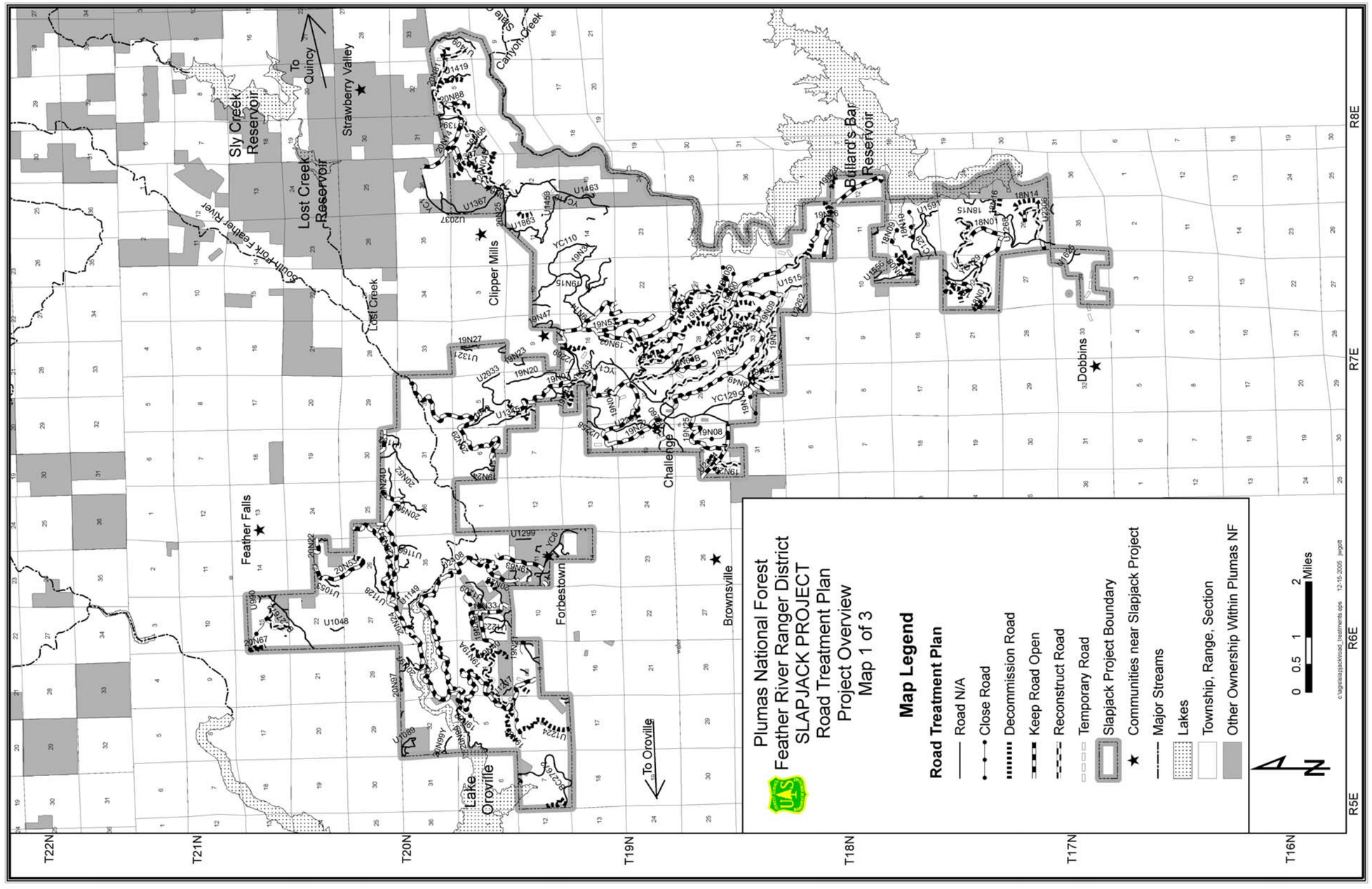

Figure A-3a. Slapjack Project road treatment plan, project overview.

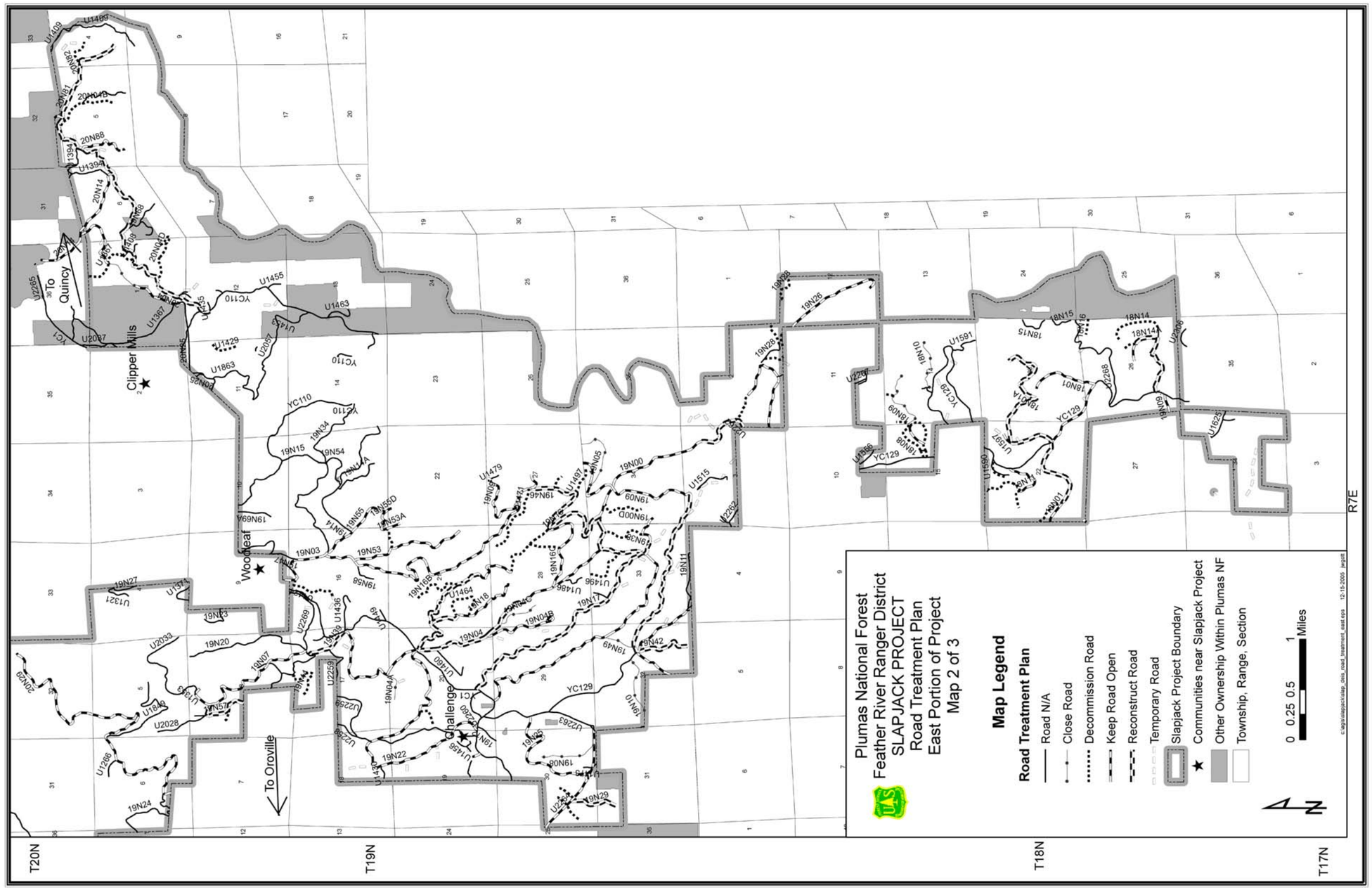

Figure A-3b. Slapjack Project road treatment plan, east portion of the project area.

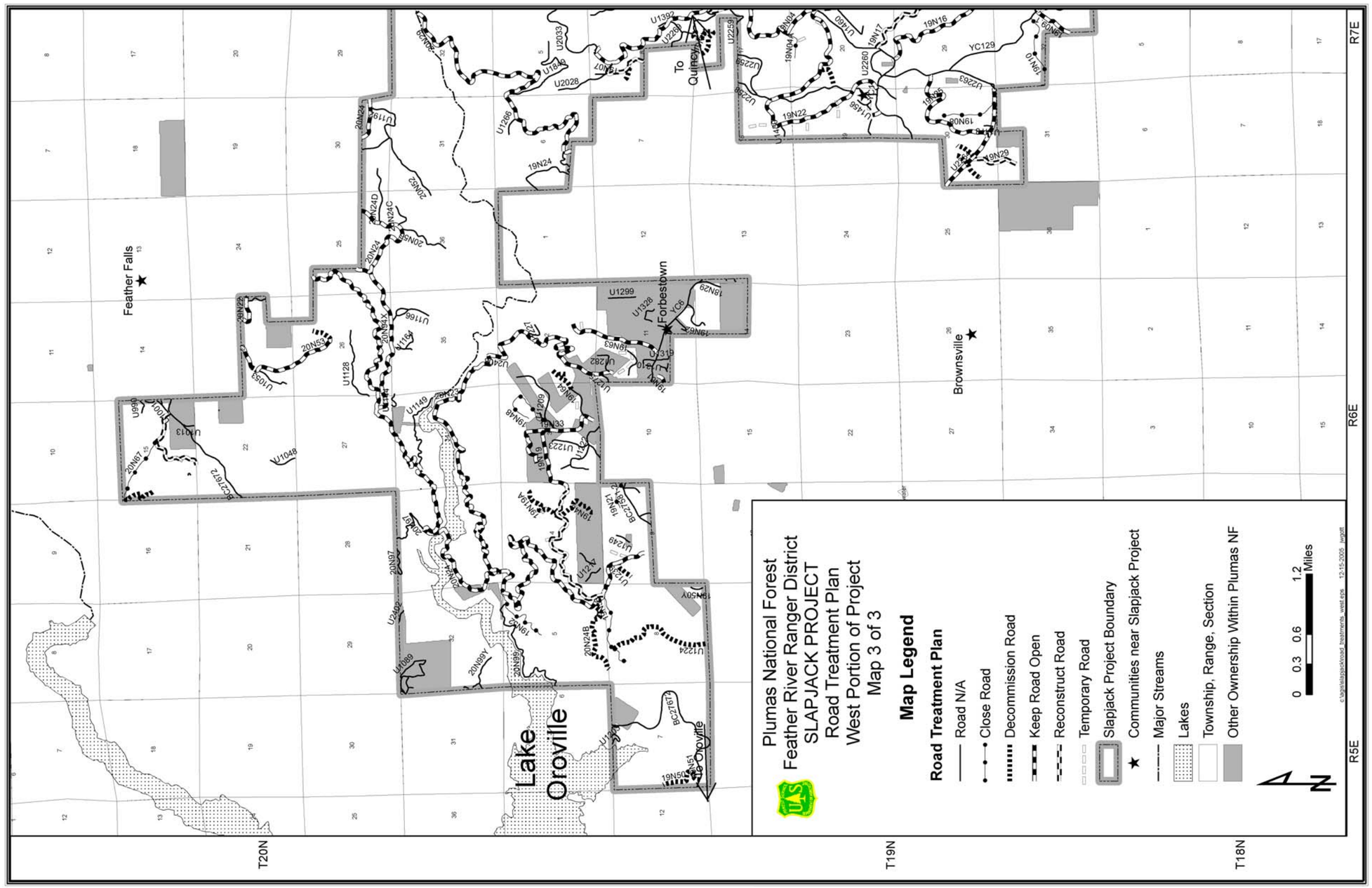

Figure A-3c. Slapjack Project road treatment plan, west portion of the project area.

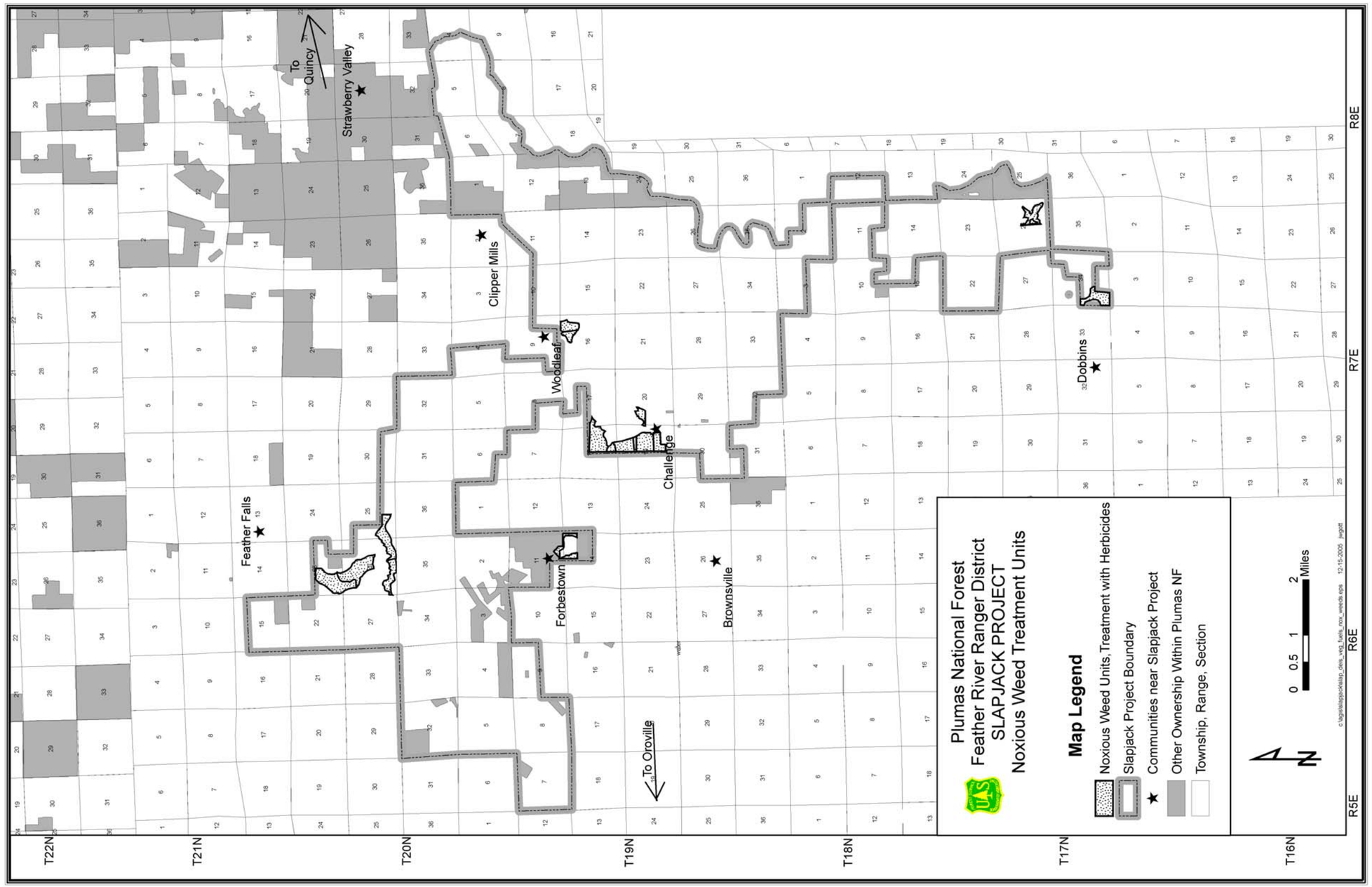

Figure A-4. Slapjack Project noxious weed treatment units.

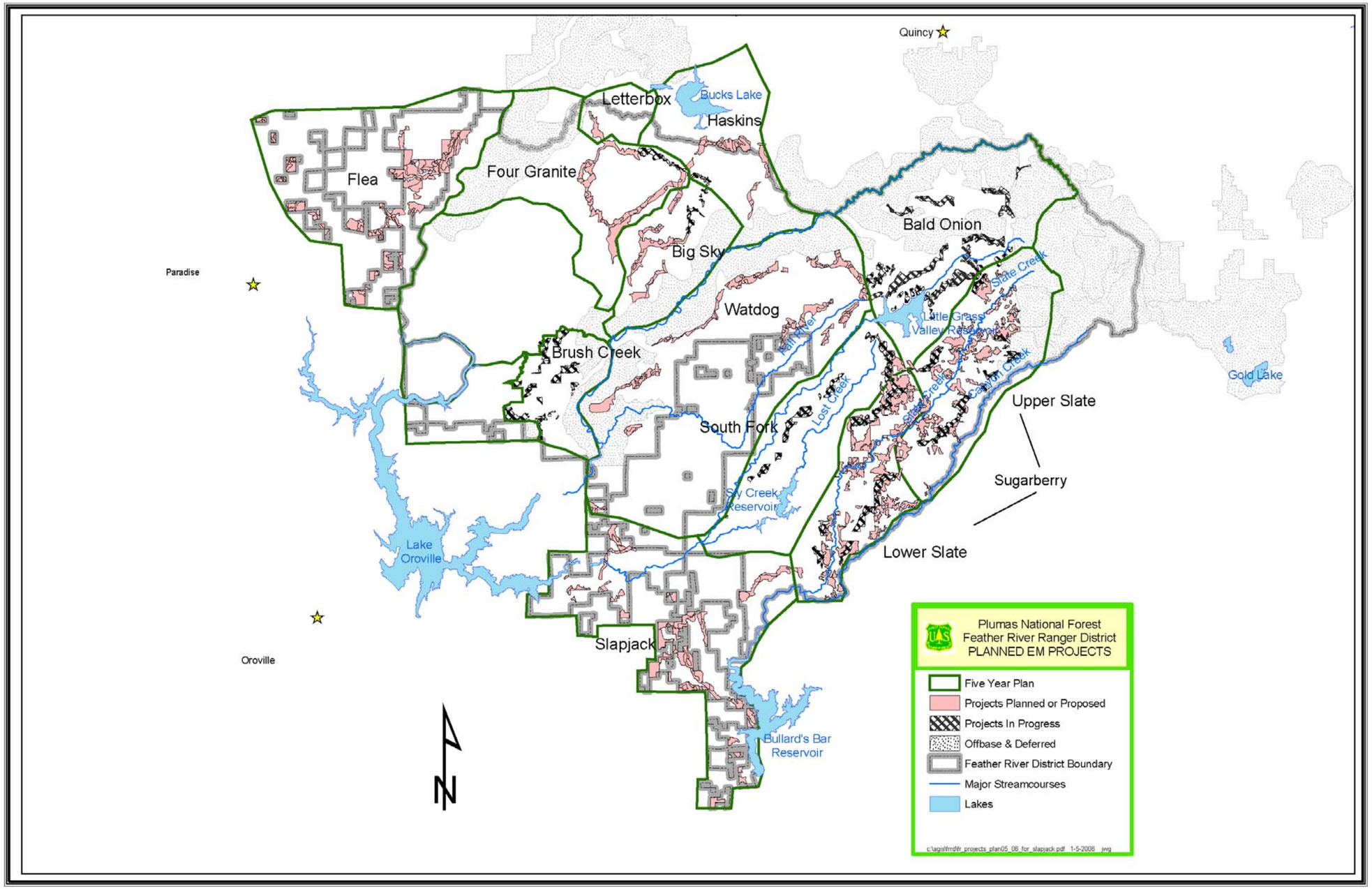

Figure A-5a. Planned and proposed projects on the Feather River Ranger District.

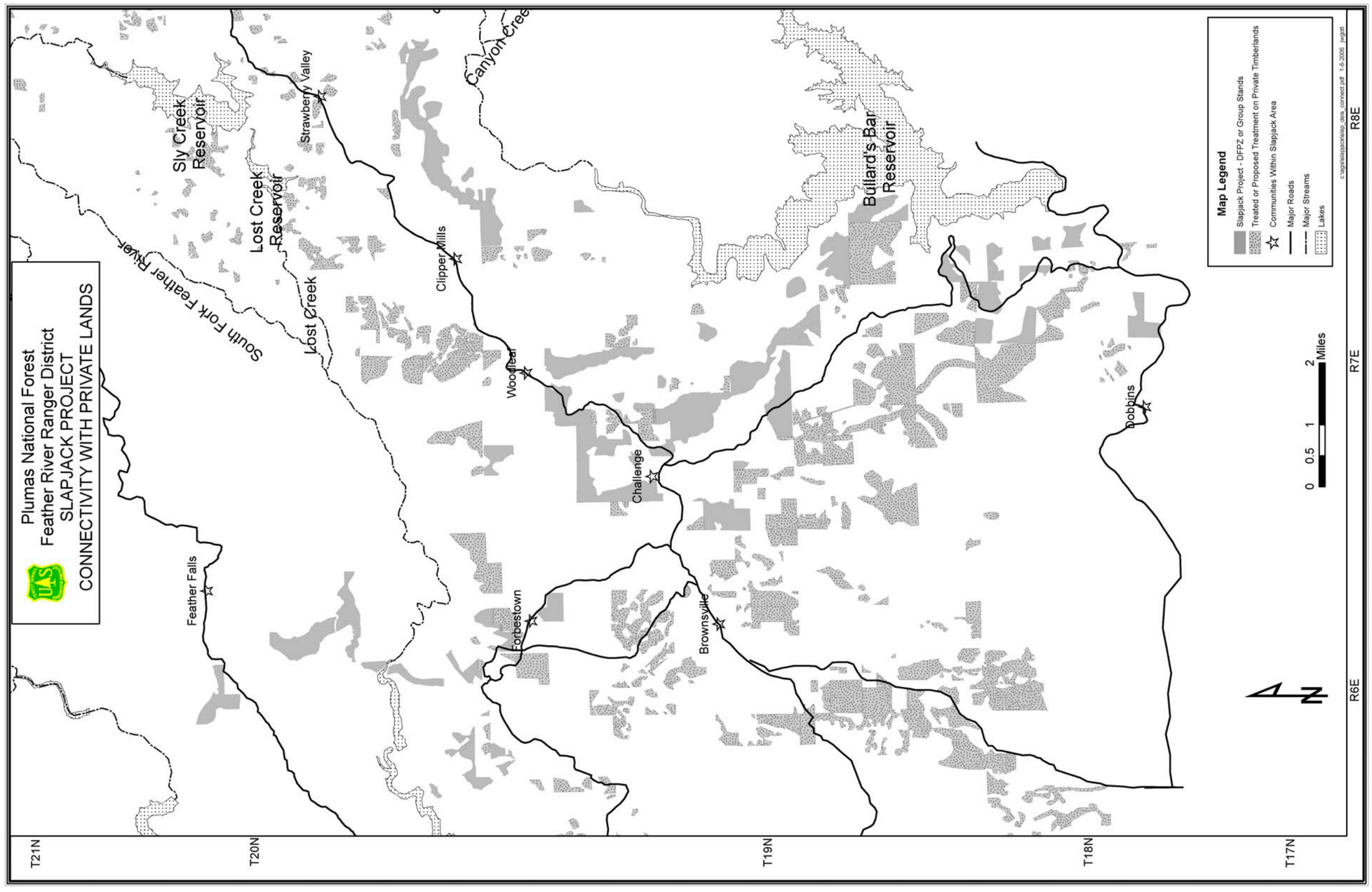

Figure A-5b. Slapjack Project connectivity with private lands.

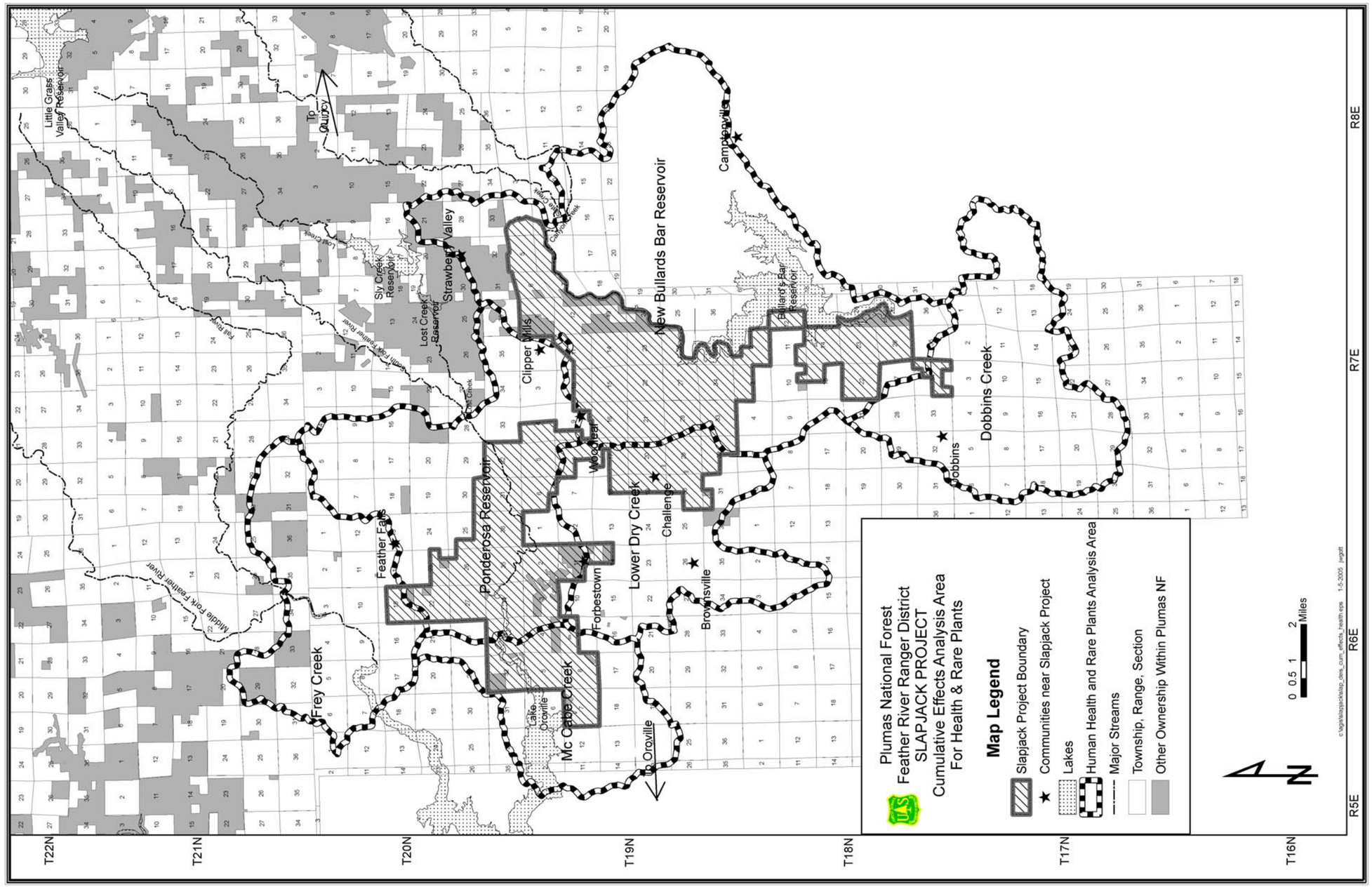

Figure A-6. Cumulative effects analysis area for health and rare plants.

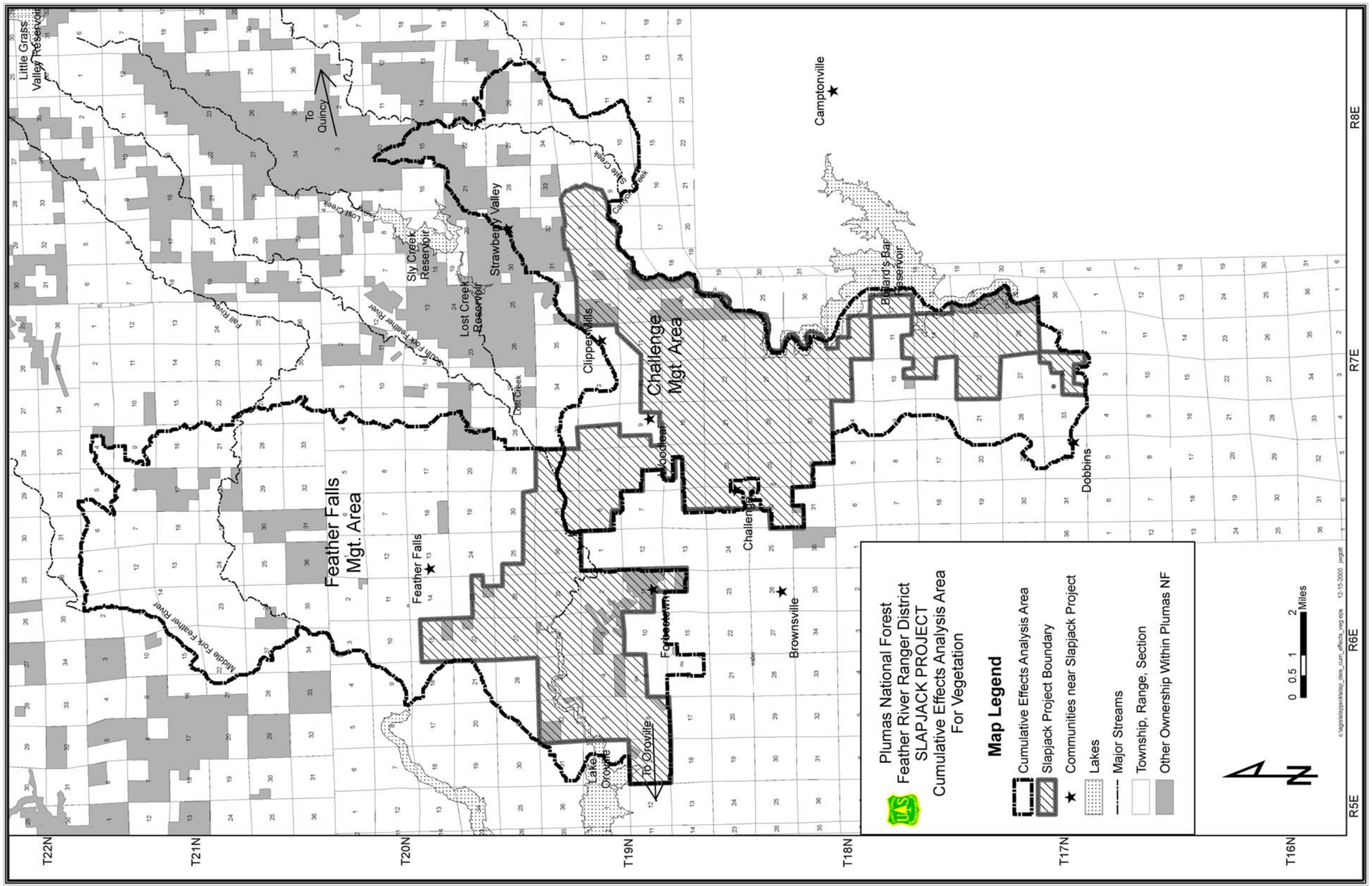

Figure A-7. Cumulative effects analysis area for vegetation.

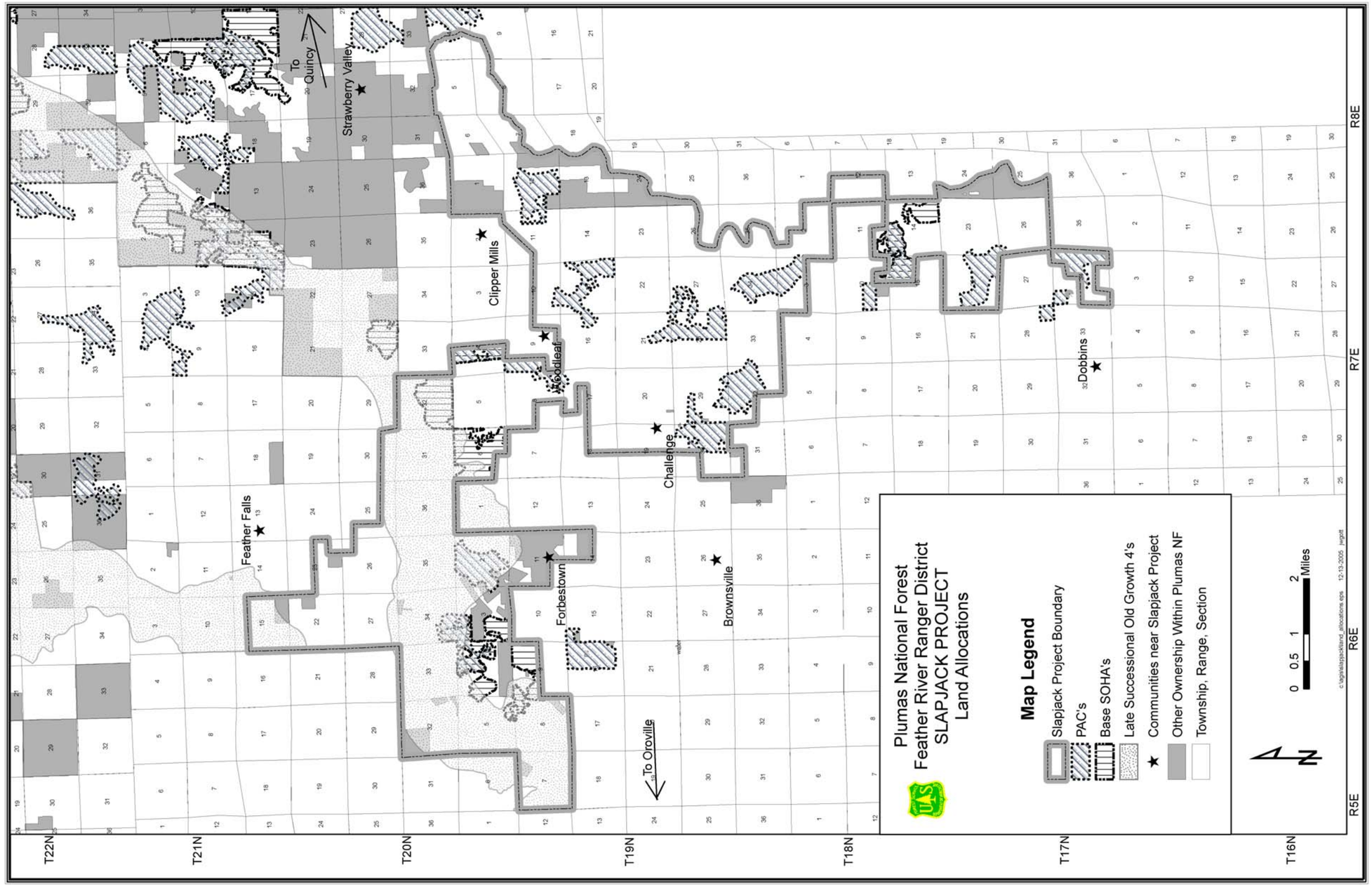

Figure A-8. Slapjack Project land allocations.

Appendix B

Proposed Vegetation Treatment Schedules, Proposed DFPZs by Treatment Unit, Proposed Group Selections Outside of DFPZs, and Proposed Individual Tree Selection Units

Appendix B
Proposed Vegetation Treatment Schedules

Generalized Silvicultural Prescription Schedules

Table B-1 displays an example of a proposed treatment schedule for a typical Defensible Fuel Profile Zone (DFPZ). In general, the first treatment for the DFPZs would be thinning from below through sawlog and biomass whole-tree removal (harvest) or mechanical mastication (nonharvest). After mastication, selected plantations would be pruned to raise the crown height. The next treatment would be to hand cut (thin) and pile the slash, particularly in the steep (greater than 45 percent) slopes and in Riparian Habitat Conservation Areas. Grapple pulling and piling of shrubs would also be completed at this time. After thinning activities have been completed, firelines would be constructed, and the machine and hand piles would be burned. Once all of the piles are burned, the proposed underburn stands would be reevaluated to determine if underburning is necessary to treat any remaining slash and competing vegetation. In addition, approximately five years after mastication, those stands would be reevaluated to determine if an underburn would be necessary to further reduce the fuel loading.

Table B-1. Example of a proposed treatment schedule for a DFPZ.

Defensible Fuel Treatment Zone Proposed Treatment Schedule		
Year	**Activity**	**Method**
1	Harvest – DFPZ	Whole-tree sawlog and biomass removal
1	Nonharvest - DFPZ	Masticate
2	Fuels pre-preatment	Hand cut and pile slash (riparian zones/steep areas)
2	Fuels pre-preatment	Hand prune and pile slash (selected plantations)
2	Fuels pre-preatment	Grapple pull and pile shrubs (selected stands)
3	Fuels pre-preatment	Fireline construction (manual or mechanical)
3	Fuels preatment	Burn piles
4	Fuels preatment	Underburn or masticate to reduce fuels
5–9	Fuels preatment	Underburn mastication units if needed

Table B-2 provides an example of a proposed treatment schedule for a typical group selection harvest. Group selection harvest areas would be harvested or logged in conjunction with the DFPZ that the group is located in. Site preparation would be the next treatment and consists of grapple piling and burning the piles, followed by underburning or mastication. After site preparation has been completed, reforestation or hand planting of various conifer species would occur. Once the seedlings are established, two release treatments would be implemented to reduce competing vegetation and ensure seedling survival.

Table B-3 provides an example of a proposed treatment schedule for a typical individual tree selection harvest. Individual tree selection harvest areas would be harvested or logged in conjunction with the group selection areas in the stand.

Table B-2. Example of a proposed treatment schedule for a group selection harvest.

Group Selection Harvest Proposed Treatment Schedule		
Year	**Activity**	**Method**
1	Harvest – group selection	Whole-tree sawlog and biomass removal
2	Site preparation	Grapple or hand pile slash or shrubs
3	Site preparation	Burn piles
4	Site preparation	Underburn or masticate to reduce fuels
5	Reforestation	Hand plant and natural regeneration
6	Release (first treatement)	Hand grub – grasses, forbs, and shrubs
8	Release (second treatment)	Hand cut – larger shrubs

Table B-3. Example of a proposed treatment schedule for an individual tree selection stand.

Individual Tree Selection Harvest Proposed Treatment Schedule		
Year	**Activity**	**Method**
1	Harvest – individual tree selection	Whole-tree sawlog
2	Fuels treatment	Grapple pile project-generated slash
3	Fuels treatment	Burn piles

Table B-4. Proposed DFPZ treatments by group selection unit, including proposed herbicide use for DFPZ maintenance and noxious weed control.

Group Selection Unit Number	Prescription	Approximate Acres	Approximate Acres of Group Selec tion[a]	Herbicides for DFPZ Maintenance (Alternatives B, E, and F)	Herbicides for Weed Control (Alternatives B, D, and F)
1	Harvest	19	0		
2	Masticate	2	0		
3	Harvest	16	1.5		
4	Harvest	27	0		
4TE	Harvest	2	0		
5	Masticate	48	7	X	
6	Masticate	2	0		
7	Masticate	8	0		
9	Masticate	7	0		
10	Masticate	2	0		
11	Harvest	111	12.5	X	
12	Harvest	75	7.5	X	
13	Masticate	17	0	X	
14	Harvest	91	0		
16	Harvest	16	0		

Table B-4. Proposed DFPZ treatments by group selection unit, including proposed herbicide use for DFPZ maintenance and noxious weed control (continued).

Group Selection Unit Number	Prescription	Approximate Acres	Approximate Acres of Group Selection[a]	Herbicides for DFPZ Maintenance (Alternatives B, E, and F)	Herbicides for Weed Control (Alternatives B, D, and F)
17	Masticate	13	0		
18	Harvest	44	0	X	
18a	Harvest	11	0	X	
18b	Harvest	39	0	X	
18b	Harvest	6	0		
18SA	Harvest	22	0	X	
18SB	Harvest	42	0	X	
18SB	Harvest	16	0	X	
19	Harvest	44	0		
20	Harvest	22	0	X	
20S	Harvest	47	0	X	
21	Hand cut / pile burn	7	0		
22	Masticate	9	0		
23	Masticate	18	0		
25	Masticate	5	0		X
26	Harvest	187	0	X	
27	Masticate	7	0		
29A	Harvest	45	0		X
29B	Harvest	63	0		X
30	Harvest	90	0	X	X
31	Harvest	13	0	X	
32	Harvest	16	0	X	
32a	Harvest	3	0	X	
32TE	Harvest	3	0	X	
33	Masticate	23	0		
34	Harvest	46	0		
34a	Harvest	3	0		
34TE	Harvest	7	0		
35	Harvest	82	8		
35TE	Harvest	3	0		
36	Harvest	34	4.5	X	
38	Masticate	31	0		X
39	Harvest	19	0		
40	Masticate	64	0	X	
41	Harvest	35	3.5	X	X
43	Harvest	48	0	X	
47	Harvest	40	7.5		
47A	Harvest	2	0		
47SA	Harvest	10	0		
47SB	Harvest	17	0		
48	Masticate	18	0		
51	Harvest	77	10.5		
52	Masticate	98	0	X	
53	Harvest	54	5	X	
54	Harvest	156	15.5	X	

Table B-4. Proposed DFPZ treatments by group selection unit, including proposed herbicide use for DFPZ maintenance and noxious weed control (continued).

Group Selection Unit Number	Prescription	Approximate Acres	Approximate Acres of Group Selection[a]	Herbicides for DFPZ Maintenance (Alternatives B, E, and F)	Herbicides for Weed Control (Alternatives B, D, and F)
59	Hand cut / pile burn	59	0		
60	Harvest	90	9	X	
61	Harvest	58	5.5		
62	Harvest	9	0.8		
62	Underburn	2	0		
63	Harvest	74	7		
64	Masticate	14	0		
64B	Underburn	11	0		
66	Harvest	5	0	X	
66S	Harvest	9	0	X	
67	Masticate	18	0		
72	Underburn	72	0		
73	Underburn	30	0		
74	Underburn	47	0		X
75	Underburn	75	0		X
76	Underburn	49	0		
77	Underburn	110	0		X
78	Masticate	110	0		X
79	Masticate	19	0		
80	Masticate	15	0		
81	Harvest	13	0		
81S	Harvest	18	0		
82	Masticate	67	0		
83	Masticate	50	0		
84	Harvest	57	0		
84TE	Harvest	5	0		
85	Harvest	103	11	X	
85TE	Harvest	3	0	X	
85TE	Harvest	2	0	X	
91	Harvest	34	0	X	
92	Harvest	37	0	X	
93	Harvest	18	0	X	
94	Harvest	28	0	X	
95	Underburn	15	0		
96	Masticate	5	0		
97	Masticate	16	0		
98	Masticate	19	0		
99	Underburn	54	0		
117	Underburn	39	0		
125	Masticate	4	0		
129	Harvest	34	3	X	X
133	Underburn	16	0		
138	Underburn	53	0		
141	Masticate	7	0		
152	Masticate	7	0		

Table B-4. Proposed DFPZ treatments by group selection unit, including proposed herbicide use for DFPZ maintenance and noxious weed control (continued).

Group Selection Unit Number	Prescription	Approximate Acres	Approximate Acres of Group Selection[a]	Herbicides for DFPZ Maintenance (Alternatives B, E, and F)	Herbicides for Weed Control (Alternatives B, D, and F)
154	Harvest	50	5.5		
159	Masticate	33	0		X
183A	Harvest	23	0		
183B	Harvest	9	0		
184	Underburn	59	0		X
198	Hand cut / pile burn	21	0		
203	Masticate	18	0		
229	Harvest	21	0	X	X
283	Masticate	7	0		
284	Harvest	15	1.5		
329	Harvest	9	0		X
401	Masticate	8	0		
402	Masticate	3	0		
429	Harvest	12	0	X	X
542	Masticate	16	0		
607	Masticate	5	0		
851	Masticate	6	0		
879	Masticate	16	0		
910	Masticate	115	0	X	
917	Masticate	112	0	X	
921	Harvest	20	0		
921a	Harvest	9	0		
921S	Harvest	11	0		
922	Harvest	26	0	X	
979	Masticate	25	0		X
991	Harvest	44	0		
992	Harvest	21	0		
999	Underburn	40	0		
9401	Masticate	13	0		
	Total	4,420	126		

Note:

a. In DFPZ treatment units, the total acreage of group selections would not exceed 10 percent of the total DFPZ unit area, as recommended by Weatherspoon (1996).

Table B-5. Approximate acres of group selection harvest outside of DFPZs.

Unit Number	Total Unit Acres	Approximate Acres of Group Selection[a]
504	14	1.6
505	16	1.8
506	4	0.5
507	32	3.6
514	13	1.5
515	20	2.3
517	15	1.7
519[b]	40	4.5
522[c]	26	3.0
523[c]	22	2.5
524[b]	51	5.8
525[b]	77	8.8
526	23	2.6
527	71	8.1
528	106	12.1
530	44	5.0
531	95	10.8
533	19	2.2
534	16	1.8
536	11	1.2
537	17	1.9
538	43	1.7
542	27	3.1
543	10	0.8
545	23	2.6
Total	**886**	**96**

Notes:

a. Groups would be placed at a rate of about 11.4 percent but could be up to 20 percent of the unit area.

b. Individual tree selection harvest would be conducted on approximately 148 acres in units 519, 524, and 525 in the area surrounding the group selections.

c. Units 522 and 523 are not proposed for group selection under alternatives F and G because of watershed concerns.

Table B-6. Approximate acres of individual tree selection (ITS) harvest by unit.

Unit Number[a]	Approximate Acres of ITS	Total Unit Acres
519	35	40
524	45	51
525	68	77
Total	**148**	**168**

Note:

a. Group selection harvest would be conducted on approximately 20 acres in units 519, 524, and 525.

Appendix C

Human Health Risk Assessment

Appendix C
Human Health Risk Assessment

This appendix is based on those portions of the "Appendix G: Human Health risk Assessment" of the *Herger-Feinstein Quincy Library Group Forest Recovery Act Final Supplemental Environmental Impact Statement* (HFQLG Act final supplemental EIS) that pertain to the proposed use of imazapyr and triclopyr formulations in the project area. It is also based on site-specific information for the Slapjack Project used to calculate the risks of herbicide exposure to workers and the public.

Herbicides

The Slapjack Project proposes to use the same application rates of imazapyr and triclopyr (see tables C-1 and C-2) as analyzed in the HFQLG Act final supplemental EIS; therefore, a separate human health risk assessment is not required. The hazard analysis, exposure assessment, dose response assessment, risk characterizations, tables, and worksheets that pertain to imazapyr and triclopyr are hereby incorporated by reference from appendix G of the HFQLG final supplemental EIS.

Table C-1. Chemicals, application rates, and application volumes that would be used for DFPZ Maintenance.

Chemical	Application Rate (ounces / acre)	Acid Equivalents (pounds / acre)	Application Volume Minimum to Maximum (gallons / acre)	Concentration Minimum to Maximum (percent)	Typical Application Volume (gallons / acre)	Typical Concentration (percent)
Imazapyr (Arsenal AC)	8	0.25	5 to 20	0.313 to 1.250	10	0.625
Syl-Tac® (Surfactant)	1.6 to 6.4	NA		0.25		0.25
Hi-Light® Blue (Dye)	1.6 to 6.4	NA		0.25		0.25

Table C-2. Chemicals, application rates, and application volumes that would be used for noxious weed control.

Chemical	Application Rate (ounces / acre)	Acid Equivalents (pounds / acre)	Application Volume Minimum to Maximum (gallons / acre)	Concentration Minimum to Maximum (percent)	Typical Application Volume (gallons / acre)	Typical Concentration (percent)
Triclopyr (Garlon 4™)	48	1.5	10 to 40	0.938 to 3.750	20	1.875
Syl-Tac® (Surfactant)	3.2 to 12.8	NA		0.25		0.25
Hi-Light® Blue (Dye)	3.2 to 12.8	NA		0.25		0.25

Dose-Response Assessment

The doses received under various scenarios are described in the following sections. The doses are evaluated against the reference dose (RfD). If all of the exposures are below the RfD (hazard quotient less than or equal to 1), the assumption is that use of the herbicide presents little risk either the worker or the public. If any exposure exceeds the RfD, a closer examination of various studies and exposure scenarios must be made to determine whether a toxic response is expected from the exposure. Table C-3 displays the acute and chronic RfD used in this analysis.

Table C-3. Reference Doses of herbicides.

Herbicide	Reference Dose (mg/kg/day)[a]	
	Acute	Chronic
Imazapyr	2.5	2.5
Triclopyr	0.3	0.05

Note:
a. mg/kg/day = milligrams per kilogram per day.

Risk Characterization

A quantitative summary of the risk characterization for workers associated with exposure to these herbicides is presented in the following sections. The quantitative risk characterization is expressed as the hazard quotient, which is the ratio of the estimated exposure doses to the RfD. Like the quantitative risk characterization for workers, the quantitative risk characterization for the general public is expressed as the hazard quotient, which again is the ratio of the estimated exposure doses to the RfD.

The only reservation attached to this assessment is that associated with any risk assessment: Absolute safety cannot be proven and the absence of risk can never be demonstrated. No chemical has been studied for all possible effects and the use of data from laboratory animals to estimate hazard or the lack of hazard to humans is a process that contains uncertainty. Prudence dictates that normal and reasonable care should be taken in the handling of these herbicides.

Worker Exposure and Risk Analysis

Pesticide applicators are likely to be the individuals who are most exposed to a pesticide during the application process. Two types of worker exposure assessments are considered: general and accidental/ incidental. The term general exposure assessment is used to designate those exposures that involve estimates of absorbed dose based on the handling of a specified amount of a chemical during specific types of applications. The accidental/incidental exposure scenarios involve specific types of events that could occur during any type of application.

Pesticide application involves many different job activities, exposure rates can be defined for two categories: directed foliar applications (including cut surface, streamline, and direct sprays) involving the use of backpacks or similar devices, and broadcast hydraulic spray applications. While these may be viewed as crude groupings, the variability in the available data does not seem to justify further segmenting the job classifications (such as hack-and-squirt or injection bar).

The exposure of workers is based on the number of hours worked per day, acres treated per hour, and the application rates of the various herbicides. Rather than focus on a single value, each of these factors involves a range of values, which create three levels of exposure, referred to as typical, lower, and upper exposure levels. The typical level is based on current experience in forestry application in the Forest Service Pacific Southwest Region. The upper level is a worst-case level, resulting from the highest application rates, the lowest dilution rate, and the largest number of acres treated per day. The lower level is based on application rates that have been used but are considered low. The herbicides and the application rates for Defensible Fuel Profile Zone (DFPZ) maintenance and noxious weed control are shown in table C-4.

Table C-4. Herbicide rates for DFPZ maintenance and noxious weed control.

	Application Rate (pounds of active ingredient per acre)		
Herbicide	**Typical Rate**	**Lower Rate**	**Upper Rate**
Imazapyr	0.25	0.08	2.5
Triclopyr BEE	1.5	0.5	4.0

Occupational exposures may involve multiple routes of exposure (oral, dermal, and inhalation), but dermal exposure is generally the predominant route for herbicide applicators. Typical multi-route exposures are encompassed by the methods used on general exposures. Accidental exposures, on the other hand, are most likely to involve splashing a solution of herbicide into the eyes or through dermal contact.

There are various methods for estimating absorbed doses associated with accidental dermal exposure. Two general types of exposure are modeled: those involving direct contact with a solution of the herbicide and those associated with accidental spills of the herbicide onto the surface of the skin. Any number of specific exposure scenarios could be developed for direct contact or accidental spills by varying the amount or concentration of the chemical on or in contact with the surface of the skin and by varying the surface area of the skin that is contaminated. For this risk assessment, two exposure scenarios are developed for each of the two types of dermal exposure, and the estimated absorbed dose for each scenario is expressed in units of milligrams of chemical per kilograms of body weight (mg chemical/kg body weight).

Exposure scenarios involving direct contact with solutions of the chemical are characterized by immersion of the hands for one minute or wearing contaminated gloves for one hour. Generally, it is not reasonable to assume or postulate that the hands or any other part of a worker will be immersed in a solution of an herbicide for any period of time. On the other hand, contamination of gloves or other clothing is quite plausible. For these exposure scenarios, the key element is the assumption that wearing gloves grossly contaminated with a chemical solution is equivalent to immersing the hands in a solution. In either case, the concentration of the chemical in solution that is in contact with the surface of the skin, and the resulting dermal absorption rate, are essentially constant. Exposure scenarios involving chemical spills on to the skin are characterized by a spill on to the lower legs as well as a spill on to the hands. In these scenarios, it is assumed that a solution of the chemical is spilled on to a given surface area of skin and that a certain amount of the chemical adheres to the skin.

Under typical concentrations, backpack sprayers can apply the proposed herbicides without experiencing exposures for which the hazard quotient exceeds 1 (table C-5). This implies that a worker could apply herbicides over a long period of time without experiencing toxic effects. For triclopyr, however, the hazard quotient for the upper application rate equals 5. The health consequences of this exposure level are likely to vary with the duration of use. Workers who occasionally apply triclopyr would probably not experience any significant adverse effects. Workers applying triclopyr over a prolonged period (in the course of a single season or multiple seasons) could be at risk for impaired kidney function. At the upper limit of exposure, some impairment of kidney function of workers using triclopyr over a prolonged period is plausible. Triclopyr has been used extensively without reports of acute toxic effects on workers. No epidemiologic studies in workers or other individuals chronically exposed to triclopyr have been conducted that would permit the assessment of potential adverse effects on the kidney.

Table C-5. Hazard quotients (non-cancer) for backpack applicators – general (non-accidental) exposures to herbicides.

	Hazard Quotient		
Herbicide	Typical Rate	Lower Rate	Upper Rate
Imazapyr	0.0006	0.00001	0.08
Triclopyr BEE	0.2	00.4	6.0

Table C-6 displays the hazard quotient for risks to workers from accidents and incidents. As stated earlier, the hazard quotient is based on the RfD (reference dose), which is itself a measure of acceptable chronic exposure. Since accidents would be infrequent events, the use of hazard quotient for accident scenarios is inherently conservative. All accidental exposure of imazapyr would result in hazard quotient less than 1, and the risk of effects would therefore be considered negligible. However, the accidental exposure scenario of wearing gloves contaminated with triclopyr for one hour exceeds the RfD for both the typical and upper application rates. This indicates that even at the typical application rates, it is critical that the workers practice good hygiene of changing contaminated gloves and washing hands. If a worker applies triclopyr BEE often, and does not practice good industrial hygiene, then some adverse kidney effects are plausible. Since triclopyr BBE is not applied at the highest application rate, and appropriate steps (practicing good hygiene) would be taken to ensure workers are not exposed to maximum rates, the risk to workers would be substantially reduced.

Table C-6. Hazard quotient (non-cancer) for backpack applicators, accidental/incidental exposures for typical and upper application rates of herbicides.

	Hazard Quotient							
	Immersion of hands, (1 minute)		Contaminated gloves, (1 hour)		Spill on hands, (1 hour)		Spill on lower legs, (1 hour)	
Herbicide	Typical	Upper	Typical	Upper	Typical	Upper	Typical	Upper
Imazapyr	0.000005	0.0003	0.0003	0.02	0.00005	0.003	0.0001	0.008
Triclopyr BEE	0.04	0.5	2	30	0.006	0.1	0.02	0.2

Public Exposure and Risk Analysis

Under normal conditions, members of the general public would not be exposed to substantial levels of any of these herbicides. Members of the public would not be in the vicinity of DFPZ treatment units during herbicide applications. In addition, signs would be posted warning the public that an area had been recently treated.

A number of exposure scenarios can be constructed for the general public, depending on various assumptions regarding application rates, dispersion, canopy interception, and human activity. Several highly conservative scenarios are developed for this risk assessment. The two types of exposure scenarios developed for the general public includes acute exposure and longer-term or chronic exposure. All of the acute exposure scenarios are primarily accidental. They assume that an individual is exposed to the compound either during or shortly after its application. Specific scenarios are developed for direct spray, dermal contact with contaminated vegetation, as well as the consumption of contaminated fruit, water, and fish. Most of these scenarios should be regarded as extreme, some to the point of limited plausibility. The longer-term or chronic exposure scenarios parallel the acute exposure scenarios for the consumption of contaminated fruit, water, and fish but are based on estimated levels of exposure for longer periods after application.

Direct Spray. Direct sprays involving ground applications are modeled in a manner similar to accidental spills for workers. In other words, it is assumed that the individual is sprayed with a solution containing the compound and that an amount of the compound remains on the skin and is absorbed by first-order kinetics. For direct spray scenarios, it is assumed that during a ground application, a naked child is sprayed directly with the herbicide. The scenario also assumes that the child is completely covered (that is, 100 percent of the surface area of the body is exposed), which makes this an extremely conservative exposure scenario that is likely to represent the upper limits of plausible exposure. An additional set of scenarios are included involving a young woman who is accidentally sprayed over the feet and legs. For each of these scenarios, some standard assumptions are made regarding the surface area of the skin and body weight. Table C-7 displays the hazard quotients for the public direct-spray scenarios.

Table C-7. Hazard quotient (non-cancer) for the public, direct spray scenario.

Herbicide	Hazard Quotient			
	Child (Application Rate)		Woman (Application Rate)	
	Typical	Upper	Typical	Upper
Imazapyr	0.00.	0.1	0.0002	0.01
Triclopyr BEE	0.2	4.0	0.02	0.4

The direct spray of a naked child with triclopyr BEE at the upper application rate results in exposure that exceeds the level of concern (a hazard quotient of 4). As stated in the HFQLG Act final supplemental EIS (section 4 of appendix G), the acute RfD could be considered to be in the range of 0.3 to 1.8 mg/kg. The exposure of a child is within this range (1.2 mg/kg), so adverse effects from this type of accident would not be expected.

Dermal Exposure from Contaminated Vegetation. In this exposure scenario, it is assumed that the herbicide is sprayed at a given application rate and that an individual comes in contact with sprayed vegetation or other contaminated surfaces at some period after the spray operation. For these exposure scenarios, some estimates of dislodgeable residue, and the rate of transfer from the contaminated vegetation to the surface of the skin, must be available. No such data are directly available for these herbicides, and the estimation methods of Durkin et al. (1995, as referenced in SERA 1999a) are used. Table C-8 displays the hazard quotients for the public who may contact sprayed vegetation.

Table C-8. Hazard quotient (non-cancer) for the public – contact with vegetation sprayed with herbicides.

Herbicide	Hazard Quotient	
	Typical Application Rate	Upper Application Rate
Imazapyr	0.0002	0.008
Triclopyr BEE	0.02	0.2

The hazard quotient values for the members of the public who might contact sprayed vegetation for all applications rates and herbicides are less than one; therefore, the risk of effects is considered negligible.

Water Contamination. Water can be contaminated from runoff as a result of leaching from contaminated soil, from a direct spill, or from unintentional contamination from applications. For this risk assessment, the two types of estimates made for the concentration of these herbicides in ambient water are acute/accidental exposure from an accidental spill and longer-term exposure to the herbicides in ambient water that could be associated with the typical application of this compound to a 100-acre treatment area. The acute exposure scenario assumes that a young child (2 to 3 years old) consumes 1 liter of contaminated water (a range of 0.6 to 1.5 liter) shortly after an accidental spill of 200 gallons of a field solution into a pond that has an average depth of 1 meter and a surface area of 1000 square meters, or about one-quarter acre. Because this scenario is based on the assumption that exposure occurs shortly after the spill, no dissipation or degradation of the herbicide is considered. This is an extremely conservative scenario dominated by arbitrary variability. The actual concentrations in the water would depend heavily on the amount of compound spilled, the size of the water body into which it is spilled, the time at which water consumption occurs relative to the time of the spill, and the amount of contaminated water that is consumed. It is also unlikely that ponds would be the water body receiving any herbicides in this project. Flowing streams are the more likely recipients, so dilution would occur. For these reasons, a second scenario is developed in which a stream is contaminated through drift, runoff, or percolation and a child consumes water from that stream. For the level of herbicide in this stream, an assumption of the water contamination rate is developed. The scenario for chronic exposure to these herbicides from contaminated water assumes that an adult (70 kg male) consumes contaminated ambient water for a lifetime. There are some monitoring studies available on various herbicides that allow for an estimation of expected concentrations in ambient water associated with ground applications of the compounds over a wide area.

Table C-9 displays the hazard quotient values for the public drinking contaminated water. These scenarios involve a child drinking from a pond immediately after a spill, from a stream subjected to herbicide drift, and an adult drinking water from the same contaminated pond over a lifetime. The assessment of these scenarios indicates that a spill of herbicide into a water body needs to be strongly avoided by using the management requirements described in chapter 2.

Table C-9. Hazard quotient (non-cancer) for the public – drinking water contaminated by herbicides.

Herbicide	Hazard Quotient					
	Acute-Spill Scenario		Acute-Stream Scenario		Chronic-Spill Scenario	
	Typical application rate	Upper application rate	Typical application rate	Upper application rate	Typical application rate	Upper application rate
Imazapyr	0.03	1	0.0002	0.1	0.0002	0.02
Triclopyr BEE	0.9	10	0.0005	0.008	0.001	0.006

Vegetation Contamination. Under normal circumstances, and in most types of applications, it is extremely unlikely that humans will consume, or otherwise place in their mouths, vegetation contaminated with these herbicides. Nonetheless, any number of scenarios could be developed involving either accidental spraying of crops, the spraying of edible wild vegetation, like berries, or the spraying of plants collected by Native Americans for basket weaving or medicinal use. Again, in most instances, and particularly for longer-term scenarios, treated vegetation would probably show signs of damage from herbicide exposure, thereby reducing the likelihood of consumption that would lead to significant levels of human exposure. Notwithstanding that assertion, it is conceivable that individuals could consume contaminated vegetation.

One of the more plausible scenarios involves the consumption of contaminated berries after treatment along a road or some other area in which wild berries grow. The two accidental exposure scenarios developed for this exposure assessment include one scenario for acute exposure and one scenario for longer-term exposure. In both scenarios, the concentration of herbicide on contaminated vegetation is estimated using the empirical relationships between application rate and concentration on vegetation developed by Hoerger and Kenaga (1972, as referenced in the SERA Risk Assessments). For the acute exposure scenario, the estimated residue level is taken as the product of the application rate and the residue rate. For the longer-term exposure scenario, the duration of 90 days is used, and the dissipation on the vegetation is estimated based on the estimated or established foliar halftimes.

Table C-10 displays the hazard quotient values for the scenarios involving a woman eating contaminated berries shortly after spraying and eating berries daily for 90 days after they were sprayed. The hazard quotients were less than 1 for both the acute and chronic scenario for the typical application rates. However, triclopyr showed hazard quotient values greater than 1 for the upper application rates. These scenarios are conservative in that they do not include the mitigative effects of washing contaminated vegetation. A hazard quotient of 5 indicates some uncertainty regarding effects, but it is unlikely that adverse health effects would result.

Table C-10. Hazard quotient (non-cancer) for the public, ingesting fruit contaminated by herbicides.

Herbicide	Hazard Quotient			
	Acute Exposure		Chronic Exposure	
	Typical Application Rate	Upper Application Rate	Typical Application Rate	Upper Application Rate
Imazapyr	0.001	0.2	0.0004	0.04
Triclopyr BEE	0.04	2	0.1	5

Impurities and Metabolites. Virtually no chemical synthesis yields a totally pure product. Technical grade herbicides, as with other technical grade products, undoubtedly contain some impurities. The EPA defines the term impurity as ". . . any substance . . . in a pesticide product other than an active ingredient or an inert ingredient, including un-reacted starting materials, side reaction products, contaminants, and degradation products" (40 CFR 158.153(d)). To some extent, concern for impurities in technical grade herbicides is reduced by the fact that the existing toxicity studies on these herbicides were conducted with the technical grade product. Thus, if toxic impurities are present in the technical grade product, they are likely to be encompassed by the available toxicity studies on the technical grade product. An exception to this general rule involves carcinogens, most of which are presumed to act by non-threshold mechanisms. Because of the non-threshold assumption, any amount of a carcinogen in an otherwise non-carcinogenic mixture is assumed to pose some carcinogenic risk. As with contaminants, the potential effect of metabolites on a risk assessment is often encompassed by the available in vivo toxicity studies under the assumption that the toxicological consequences of metabolism in the species on which toxicity studies are available will be similar to those in the species of concern, human in this case. Uncertainties in this assumption are encompassed by using an uncertainty factor in deriving the RfD and may sometimes influence the selection of the study used to derive the RfD.

Inert Ingredients. The issue concerning inert ingredients and the toxicity of formulations is discussed in USDA (1989, pages 4-116 to 4-119). The approach used in USDA (1989), the SERA risk assessments, and this analysis to assess the human health effects of inert ingredients and full formulations has been to (1) compare acute toxicity data between the formulated products (including inert ingredients) and their active ingredients alone; (2) disclose whether or not the formulated products have undergone chronic toxicity testing; and (3) identify, with the help of the EPA and the chemical companies, ingredients of known toxicological concern in the formulated products and assess the risks of those ingredients.

Researchers have studied the relationships between acute and chronic toxicity, and while the biological end-points are different, relationships do exist, and the acute toxicity data can be used to give an indication of overall toxicity (Zeise et al. 1984). The court in *NCAP v. Lyng* (844 F.2d 598 [9th Cir 1988]) decided that this method of analysis provided sufficient information for a decision maker to make a reasoned decision. In *SRCC v. Robertson* (Civ. No. S-91-217 [E.D. Cal., June 12, 1992]) and again in *CATs v. Dombeck* (Civ. S-00-2016 [E.D. Cal., Aug 31, 2001]), the district court upheld the adequacy of the methodology used in USDA (1989) for disclosure of inert ingredients and additives.

The EPA has categorized approximately 1,200 inert ingredients into four lists. Lists 1 and 2 contain inert ingredients of toxicological concern. List 3 includes substances for which the EPA has insufficient information to classify as either hazardous (List 1 and 2) or nontoxic (List 4). List 4 contains nontoxic substances such as corn oil, honey, and water. The use of formulations containing inert ingredients on List 3 and 4 is preferred on vegetation management projects under current Forest Service policy.

Since most information about inert ingredients is classified as "Confidential Business Information (CBI)," the Forest Service asked the EPA to review the 13 herbicides for the preparation of USDA 1989 (includes glyphosate, hexazinone, picloram, and triclopyr) and the commercial formulations, and advise if they contained inert ingredients of toxicological concern (Inerts List 1 or 2) (USDA 1989, appendix F, attachment B). The EPA determined that there were no inerts on List 1 or 2, with the exception of kerosene in certain formulations of triclopyr. Kerosene has since been moved to List 3. In addition, the CBI files were reviewed in the development of most of the SERA risk assessments. Information has also been received from the companies who produce the herbicides and spray additives.

Comparison of acute toxicity (lethal dose $[LD]_{50}$ values) data between the formulated products (including inert ingredients) and their active ingredients alone show that the formulated products are generally less toxic than their active ingredients (USDA 1989; USDA 1984; SERA 2003, 2004).

While these formulated products have not undergone chronic toxicity testing like their active ingredients, the acute toxicity comparisons, the EPA review, and Forest Service examination of toxicity information on the inert ingredients in each product, has led to the conclusion that the inert ingredients in these formulations do not significantly increase the risk to human health and safety over the risks identified for the active ingredients.

Additives

Additives (or adjuvants) to formulations that might be used when herbicides are applied were not considered in detail in "Appendix G: Human Health Risk Assessment" of the HFQLG Act final supplemental EIS, with the exception of surfactants containing nonylphenol polyethoxylate as an active ingredient. Additives might involve surfactants, drift reduction agents, and dyes and colorants. Surfactants increase the ability of the herbicide to be absorbed into plant tissues. Drift reduction agents are sometimes used with aerial application methods to change droplet size quantities and thereby decrease drift. Dyes and colorants are used to indicate that a plant or area has been treated.

Additives are not under the same registration guidelines as are pesticides, and much of the information on the ingredients in additives is considered confidential business information. The EPA *does not* register or approve the labeling of spray adjuvants, but the California Department of Pesticide Regulation *does* require the registration of those adjuvants that are considered to increase the action of the pesticide it is used with. The additives that would be mixed with the herbicides proposed for the Slapjack Project are not expected to pose an adverse risk to the health and safety of workers or the public. This is based on available information from product labels and an overview by Bakke (USDA 2002) of the various types of additives likely to be used in forest herbicide applications. Bakke includes acute toxicity data for many of the formulations used by the Forest Service.

The following additives have been analyzed for this project. These include the surfactant SYL-TAC® (or equivalent seed oil/silicone blend), which increases the ability of the herbicide to adhere to and penetrate the leaf surface, and the marker dye Hi-Light® Blue or equivalent to indicate where herbicides have been applied.

SYL-TAC®

Vegetable oil plus organosilicone surfactant (SYL-TAC®)—silicone-based surfactants, also known as organosilicones—are increasing in popularity because of their superior spreading ability. This class contains a polysiloxane chain. Oil adjuvants contain vegetable oils plus an emulsifier for dispersion in water. They have been gaining in popularity, especially for the control of grassy weeds. The purpose of oil adjuvants is to increase herbicide absorption through plant tissues and increase spray retention. They are especially useful in applications of herbicides to woody brush or tree stems to allow for penetration through the bark. The methylated seed oils are formed from common seed oils such as canola, soybean, or cotton. They act to increase penetration of the herbicide.

SYL-TAC® has a "Caution" signal word on the label, and it may cause slight skin and eye irritation. SYL-TAC® is a mixture of two other products (Hasten® and Syl-gard® 309).

- Hasten® has a "Caution" signal word on the label, and it may be irritating to the skin and eyes. The main ingredient in Hasten® contained in the SYL-TAC® product is esterified canola seed oil. The Material Safety Data Sheet lists isopropylamine as a hazardous ingredient at levels of 2 percent in the formulation.

- Syl-gard® 309 has a "Warning" signal word on the label. It is considered slightly irritating to the skin and is considered severely irritating to the eyes. It is not a skin sensitizer.

Bakke concludes that acute toxicity testing results on mammalian and aquatic species for SYL-TAC® indicate that SYL-TAC® is no more than slightly toxic when ingested, inhaled, or absorbed through the skin. SYL-TAC® is a non-ionic surfactant, which means it has no electrical charge, and in general, such surfactants have less of an effect on the skin, and hence less absorption than anionic or cationic surfactants (USDA 2002). The signal word on the SYL-TAC ® label is "Caution," and precautionary statements advise users to avoid contact with eyes and to wash thoroughly with soap and water after handling. None of the ingredients in SYL-TAC® are on the EPA's Inerts Lists 1 or 2 (USDA 2002).

There has been concern expressed about the toxicity of silicone-based surfactants on terrestrial insects. Based on a review of the current research, it would appear that surfactants have the potential to affect terrestrial insects. However, as is true with many toxicity issues, it would appear that any effect is dose related. The research does indicate that the silicone-based surfactants, due to their very effective spreading ability, may represent a risk of lethality through the physical effect of drowning, rather than through any toxicological effects. Typically, silicone surfactants are used at relatively low rates and are not applied at high spray volumes because they are very effective surfactants. Hence, it is unlikely that insects would be exposed to rates of application that could cause the effects noted in these studies. Other surfactants, which are less effective at reducing surface tension, can also cause the drowning effect. But as with the silicones, exposures have to be high, to the point of being unrealistically high, for such effects.

When considering the need for relatively high doses for a lethal effect, combined with the fact that individuals, not colonies or nests of invertebrates, may be affected, there is little chance that the surfactants could cause widespread effects on terrestrial invertebrates under normal operating conditions. Spills or accidents could result in concentrations sufficiently high to cause effects, depending upon the surfactant.

Hi-Light® Blue

Hi-Light® Blue marker dye shows what areas have been treated, confirms spray patterns, helps avoid skips and overlaps, and enables applicators to detect drift. Hi-Light® Blue is a temporary colorant that breaks down in sunlight and dissipates in rain.

The ingredients in Hi-Light® Blue are considered proprietary, and no reportable quantities of hazardous ingredients are present. No reportable quantities of toxic chemicals subject to reporting requirements of Section 313 of SARA Title III and 40 CFR 372 are present (SERA, Use and Assessment of Marker Dyes Used With Herbicides, December 1997; Material Safety Data Sheet June 2004).

Hi-Light® Blue is mildly irritating to the skin and eyes and is considered no more than slightly toxic when ingested, inhaled, or absorbed through the skin. None of the ingredients in Hi-Light® Blue are on the EPA's Inerts Lists 1 or 2 (USDA 2002). Hi-Light® Blue has no signal word on the label since it is not required to be registered as a pesticide.

Summary

The primary summary statement that can be made is that the more common risk factors for the use of these additives or adjuvants are through skin or eye exposure. These additives all have various levels of irritancy associated with skin or eye exposure. This shows the need for good industrial hygiene practices, as outlined in the state application rules, while using these products, especially when handling the concentrate during mixing. Chemical-resistant gloves and goggles should be used, especially while mixing.

Synergistic Effects. Synergistic effects are those effects resulting from exposure to a combination of two or more chemicals that are greater than the sum of the effects of each chemical alone (additive). Refer to USDA (1989, pages 4-111 to 4-114) for a detailed discussion on synergistic effects.

Instances of chemical combinations that cause synergistic effects are relatively rare at environmental exposure levels. In reviewing toxicological interactions of agricultural chemicals, Kociba and Mullison (1985) state that the scientific knowledge of toxicological effects indicates exposure to a mixture of pesticides is more likely to lead to additive rather than synergistic effects. In assessing health risk associated with drinking water, Crouch et al. (1983) reached a similar conclusion when they stated:

> U.S. EPA (1986) concludes:
>
> There seems to be a consensus that for public health concerns regarding causative (toxic) agents, the additive model is more appropriate [than a multiplicative model].

Synergism has rarely been observed in toxicological tests involving combinations of these herbicides with other commercial pesticides. The herbicide mixtures proposed for this project have not shown synergistic effects in humans who have used them extensively in forestry and other agricultural applications. However, synergistic toxic effects of herbicide combination, combinations of the herbicides with other pesticides such as insecticides or fertilizers, or combinations with naturally occurring chemicals in the environment are not normally studied. Based on the limited data available on pesticide combinations involving these herbicides, it is possible, but unlikely, that synergistic effects could occur as a result of exposure to the herbicides considered in this analysis.

It is not anticipated that synergistic effects would be seen with the herbicides and the adjuvants that might be added to them. Based on a review of several recent studies, there is no demonstrated synergistic relationship between herbicides and surfactants (Abdelghani et al. 1997; Henry et al. 1994; Lewis 1992; Oakes and Pollak 1999, 2000 as referenced in USDA 2002). However, even if synergistic or additive effects were to occur as a result of the proposed treatment, these effects are dose dependent (Dost 1991). This means that exposures to the herbicide plus any other chemical must be significant for these types of effects to be of a biological consequence. As Dost explains:

> While there is little specific published study of forestry herbicides in this particular regard, there is a large body of research on medical drugs, from which principles arise

> that govern such interactions. Amplifications of effect are not massive; one chemical cannot change the impact of another by hundreds or thousands of times. Rarely will such change be more than a few fold. This difference can be dangerous when dealing with drugs that are already at levels intended to significantly alter bodily functions, but is insignificant when both compounds are at the very low levels of exposure to be found associated with an herbicide treatment.

Based on the very low exposure rates estimated for this project, any synergistic or additive effects, if any, are expected to be insignificant.

Although the combination of surfactant and herbicide might indicate an increased rate of absorption through the skin, a review of recent studies indicates this is not often true (Ashton et al. 1986; Boman et al. 1989; Chowan and Pritchard 1978; Dalvi and Zatz 1981; Eagle et al. 1992; Sarpotdar and Zatz 1986; Walters et al. 1993, 1998; Whitworth and Carter 1969, as referenced in USDA 2002). For a surfactant to increase the absorption of another compound, the surfactant must affect the upper layer of the skin. Without some physical effect to the skin, there will be no change in absorption as compared to the other compound alone. The studies indicate that general non-ionic surfactants have less of an effect on the skin, and hence absorption, than anionic or cationic surfactants. Compound-specific studies indicate that the alkylphenol ethoxylates generally have little or no effect on absorption of other compounds. In several studies, the addition of a surfactant actually decreased the absorption through the skin. It would appear that there is little support for the contention that the addition of surfactants to herbicide mixtures would increase the absorption through the skin of these herbicides.

Sensitive Individuals. The uncertainty factors used in the development of the RfD takes into account much of the variation in human response. The uncertainty factor of 10 for sensitive subgroups is sufficient to ensure that most people will experience no toxic effects. “Sensitive” individuals are those that might respond to a lower dose than average, which includes women and children. As stated in National Academy of Sciences (NAS 1993), the quantitative differences in toxicity between children and adults are usually less than a factor of approximately tenfold. An uncertainty factor of 10 for sensitive subgroups may not cover all individuals that may be sensitive to herbicides because human susceptibility to toxic substances can vary by two to three orders of magnitude. Factors affecting individual susceptibility include diet, age, heredity, preexisting diseases, and life style. Individual susceptibility to the herbicides proposed in this project cannot be specifically predicted. Unusually sensitive individuals may experience effects even when the hazard quotient is equal to or less than 1. Further information concerning risks to sensitive individuals can be found in USDA (1989, pages 4-114 through 4-116).

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Appendix D

Slapjack Defensible Fuel Profile Zone Monitoring and Maintenance Guidelines

Appendix D
Slapjack Defensible Fuel Profile Zone Monitoring and Maintenance Guidelines

Defensible Fuel Profile Zone Monitoring

A. Short-term (Foreseeable) DFPZ Maintenance

The Record of Decision for the HFQLG final supplemental EIS calls for "consideration of all practicable methods of vegetation control for site-specific projects, including the use of herbicides." As pointed out in the that EIS (page 22), herbicides have to be used within approximately two years of the initial treatment to be most efficient and effective in delaying or preventing the buildup of understory fuels, since they change vegetation from shrubs to grasses, forbs, or ferns. If alternative B, E, or F is selected, approximately 1,954 acres of the DFPZ would be treated with herbicides. By not proposing the use of herbicides on the other units at this time (within two years of DFPZ construction) for the Slapjack Project, herbicide use is essentially precluded for use under alternatives C, D, and G. In the short term, where DFPZ objectives are not met with mastication, an underburn would be the final treatment. Based on site-specific analysis of land allocations, slopes, vegetation types, and previous underburning treatments in the Slapjack Project area, the foreseeable maintenance of the DFPZ would consist of prescribed fire, mechanical (mastication, grapple pulling) treatments, and hand treatments.

B. Long-Term (Future) DFPZ Maintenance

Given the fact that this DFPZ project is part of a five-year pilot project, it is uncertain if the Forest Service will decide to maintain these DFPZs (except if the decision to use herbicides on certain units is made at this time). Decisions regarding long-term DFPZ maintenance would be made when the time for maintenance of the natural stands is reached (approximately 10–20 years after initial treatment). By that time, the DFPZ prescription may be modified or even discontinued. If the Forest Service wishes to maintain these DFPZs in the future, sufficient funding and staffing may not be available, or other Forest Service priorities may prevent maintenance projects from being completed. Even if funding and staffing are available, it is not clear which method would be used—brush cutting by hand or heavy equipment, mastication of brush and down woody material with heavy equipment, livestock treatment, prescribed burning, or herbicide treatment. Because there are no specific plans for long-term maintenance at this point, and many questions as to the timing, extent, and method of maintenance remain open, no specific DFPZ maintenance project is reasonably foreseeable and further analysis at this time is not practical, other than for the units proposed for herbicide treatment under alternatives B, E, and F. The Forest Service will fully comply with Council on Environmental Quality requirements prior to conducting any further maintenance activities. Hence, decisions about further maintenance for a specific DFPZ would only be made at the time DFPZ maintenance is actually necessary (HFQLG final supplement EIS, Record of Decision, page 3).

C. No DFPZ Maintenance

The DFPZs should be effective for many years even if no maintenance is conducted in the future,. In the natural stands, DFPZ effectiveness should not be seriously reduced for 10 to 20 years. In the plantations, DFPZ effectiveness should not be reduced for approximately 5 years. And, after these periods, the DFPZs would retain many of their beneficial characteristics for fighting fire and reducing fire intensity. For example, even if significant amounts of understory vegetation grow in the treated stands over the next

several years, the proposed action would remove a significant amount of ladder fuel, such that the net amount of fuel would be reduced over time. Additionally, should there be a situation where a DFPZ has not been maintained for several years, but the Forest Service determines that the DFPZ would provide a safe position from which to fight an oncoming wildfire, Forest Service staff could conduct emergency maintenance at the time of the wildfire, such that the DFPZ would regain full effectives by the time the fire reaches the area.

Appendix E

Economic Analysis

Appendix E
Economic Analysis

Table E-1. Slapjack Project service contracts, alternatives B, C, D, and E.

HARVEST									
Value - Groups			Total Acres =	1		Low mbf/ac deduction	-$25		
All 23"-29.9" sawtimber[a]	0.0%	0	mbf X	($460	/mbf +	-$25	/mbf)		$0
All 10"-22.9" sawtimber **	0.0%	16	mbf X	($160	/mbf +	-$25	/mbf)		$2,160
		0	mbf	0.0	mbf/acre			0	
Value - DFPZ			Total Acres =	1558		Low mbf/ac deduction	($25)		
PP 23"-29.9" sawtimber[a]	4.0%	72	mbf X	($400	/mbf +	(-$25	/mbf)		$26,940
SP 23"-29.9" sawtimber[a]	0.0%	0	mbf X	($400	/mbf +	(-$25)	/mbf)		$0
WF 23"-29.9" sawtimber[a]	3.0%	54	mbf X	($200	/mbf +	(-$25)	/mbf)		$9,429
DF 23"-29.9" sawtimber[a]	15.0%	269	mbf X	($410	/mbf +	(-$25)	/mbf)		$103,719
IC 23"-29.9" sawtimber[a]	1.0%	18	mbf X	($460	/mbf +	(-$25)	/mbf)		$7,813
ALL 10"-22.9" sawtimber[b]	80.0%	1437	mbf X	($130	/mbf +	(-$25)	/mbf)		$150,864
		1796	mbf	1.2	mbf/acre				
Biomass Value when Removed		1558	acres X	9.6	tons/acre X	$15.00	/ton =		$224,352
Total Harvest Value		**1796**	**mbf**						**$525,277**
Costs			(Assumes Harvesting Sawtimber and Biomass in One Operation)						
Add sawtimber skyline cost		0	mbf X	$0	/mbf =				$0
Additional Cost - Heli		0	mbf X	$250	/mbf				$0
Additional Cost - Long Skid		0	mbf X	$20	/mbf				$0
		Average Unit Size =		25	acres	$25	/acre		
		Contract Length =		3	years	($51)	/acre		
		Months Operation =		6	months	$0	/acre		
Acres of 6"-9.9" biomass-tractor		0	acres X	($254	/acre +	($25)	/acre)		$0
Acres of 3"-9.9" biomass-tractor		1447	acres X	($292	/acre +	($25)	/acre)		$386,349
Acres of 6"-9.9" biomass-skyline		111	acres X	($1,000	/acre +	($25)	/acre)		$108,225
Acres of 3"-9.9" biomass-skyline		0	acres X	($2,000	/acre +	($25)	/acre)		$0
		1558	Biomass Acres						
# of sawtimber loads		1796	mbf /		4	mbf/truck =	449		
Additional Haul Cost (4 hr avg)		1	hours/trip X	$50	/hour X	449	trips		$22,450
# of biomass loads	1558	acres X	10.0	tons/acre /	25	tons/truck =	623		
Haul Cost Biomass		5.5	hours/trip X	$50	/hour X	623	trips		$171,325
Surface Replacement-sawtimber		1796	mbf X			$10.00	/mbf =		$17,960
Surface Replacement-biomass		1558	acres X	29.0	tons/acre X	1.67	/ton =		$75,303
Subsoiling Costs		109	acres X	$230	/acre				$25,084
BD Costs		1796	mbf X	$2.00	/mbf				$3,592
Road Construction-New		0.0	miles X	35,000	/mile				$0
Road Construction-Recon		4.6	miles X	5,000	/mile				$23,000

Table E-1. Slapjack Project service contracts, alternatives B, C, D, and E (continued).

Temp Roads		0.0	miles X	4,200	/mile			$0
Advertised Rate-sawtimber		1796	mbf X			$15.00	/mbf	$26,940
Advertised Rate-biomass		1558	acres X	10.0	tons/acre X	$0.20	/ton	$3,116
Yield Tax		$525,277	X	2.9%				$15,233
Scaling Sawtimber		449	trips	$17	/trip			$7,633
Scaling Biomass		623	trips	$3	/trip			$1,869
Total Harvest Cost								**$888,079**
Net Harvest Value								**($362,803)**
					Percent Above Value			-69%
Other DFPZ Service Contracts								
Mastication	1110	acres X	$500	/acre	150	7	10	$555,000
Grapple Pile	240	acres X	$450	/acre	150	2	2	$108,000
Hand Pile and Burn	87	acres X	$650	/acre	120	1	1	$56,550
Hand Prune and Pile	0	acres X	$650	/acre	120	0	0	$0
Underburn	661	acres X	$250	/acre	400	2	2	$165,250
Hand Line	895	chains X	$65	/chain	200	4	6	$58,175
Dozer Line	325	chains X	$15	/chain	5000	0	0	$4,875
Pile Burning	240	acres X	$200	/acre	120	2	3	$48,000
Other HFQLG Contracts								
Road Decommissioning	19.1	miles X	$5000	mile	40	0	1	$95,650
Harvest/Biomass-Jobs Created						20	20	
Total Jobs Created						39	46	
Total Nonharvest Cost								**1,091,500**
Total Project Value								**$728,697**
Total Full-time Jobs								**85**
Total Employee-related Income								**$3,652,738**

Assumptions:

a. Harvest Value Schedules, CA State Board of Equalization, Table 4, Area 7, Tractor, 23"-29.9"dbh

b. Harvest Value Schedules, CA State Board of Equalization, Misc. Harvest Values, Small Sawlogs, 14"-22.9" dbh

Timber Values for 10"-13.9" are $25.00/mbf

Deduction if average volume per acre under 5mbf/ac -$25

Skyline Yarding $30/mbf for 23"-29.9"(25 percent of Volume) $80/mbf for 14"-22.9"(75 percent of Volume)

Cost per acre for unit size increases 0 percent for 400 ac to 20 percent for 5 ac

Cost per acre for contract length decreases 10 percent every year after one year

Cost per acre for months of operation decreases 10 percent for 10 months or more and increases 10 percent for 4 months or less.

Based on historical relationships between employment and harvest in California during the 1980s, each million board feet harvested supports 6.5 year-around jobs (1 in logging, 4 in sawmill, and 1.5 in US Forest Service employment). In regional economic models of employment for California and the Pacific Northwest, an estimate of one indirect or induced job for every direct timber job is added. All jobs are equivalent to year-around employment.

There would be additional costs for follow up underburn or mastication and for DFPZ maintenance. Up to 2,561 acres of harvested areas and 1,110 acres of mastication would receive follow-up treatment.

Table E-2. Timber sale economic analysis for alternatives B, C, D, and E.

VALUE	Total Acres =		1369	acres	Low mbf/ac deduction	$0	mbf/ac
PP 23"-29.9" sawtimber[a]	555	mbf X (	$400	/mbf +	$0	/mbf)	$222,000
SP 23"-29.9" sawtimber[a]	45	mbf X (	$400	/mbf +	$0	/mbf)	$18,000
WF-RF 23"-29.9" sawtimber[a]	466	mbf X (	$200	/mbf +	$0	/mbf)	$93,200
DF 23"-29.9" sawtimber[a]	2201	mbf X (	$410	/mbf +	$0	/mbf)	$902,410
IC 23"-29.9" sawtimber[a]	166	mbf X (	$460	/mbf +	$0	/mbf)	$76,360
Total 23"-29.9" sawtimber	3433						
ALL 10"-22.9" sawtimber[b]	8849	mbf X (	$160	/mbf +	$0	/mbf)	$1,415,840
Biomass Value when Removed	1151	acres X	16.6	tons/acre X	$11.50	/ton =	$219,726
Total Value	12282	mbf	9.0	mbf/acre			$2,947,536
Costs	(Assumes Harvesting Sawtimber and Biomass in One Operation)						
Additional Move in/out Costs							$25,000
Add sawtimber skyline cost	700	mbf X	$76	/mbf =			$53,217
Additional Cost	0	acres X	$0	/acre			$0
	Average Unit Size =		25	acres		$31	/acre
	Contract Length =		3	years		($62)	/acre
	Months Operation =		5	months		$0	/acre
Acres of 6"-9.9" biomass-tractor	0	acres X (	$309	/acre +	($31)	/acre)	$0
Acres of 3"-9.9" biomass-tractor	1071	acres X (	$352	/acre +	($31)	/acre)	$344,219
Acres of 6"-9.9" biomass-skyline	80	acres X (	$1,500	/acre +	($31)	/acre)	$117,520
Acres of 3"-9.9" biomass-skyline	0	acres X (	$2,000	/acre +	($31)	/acre)	$0
	1151	Biomass Acres					
# of sawtimber loads	12282.0	mbf /			4	mbf/truck =	3071
Additional Haul Cost (4 hr avg)	0	hours/trip X	$75	/hour X	3071	trips	$0
# of biomass loads	1151	acres X	16.6	tons/acre /	tons/truck = 25		764
Haul Cost Biomass	4	hours/trip X	$75	/hour X	764	trips	$229,200
Surface Replacement-sawtimber	12282	mbf X			$6.00	/mbf =	$73,692
Surface Replacement-biomass	1151	acres X	16.6	tons/acre X	$0.67	/ton =	$12,801
Subsoiling Costs	200	acres X	$230	/acre			$46,000
BD Costs	12282	mbf X	$8.18	/mbf			$100,467
Road Construction	17.0	miles X	$14,600	/mile			$248,200
Advertised Rate-sawtimber	12282	mbf X	$49.89	/mbf			$612,771
Advertised Rate-biomass	1151	acres X	16.6	tons/acre X	$0.20	/ton	$3,821
Yield Tax	$2,947,536	X	2.9%				$85,479
Scaling Sawtimber	3071	trips	$60	/trip			$184,260
Scaling Biomass	764	trips	$35	/trip			$26,740
Total Cost							$2,163,387
Net Value							$784,148
				Percent Above Value			27%

Table E-2. Economic analysis for alternatives B, C, D, and E (continued).

Groups:							
Plant	219	acres X	$650	/acre			$142,350
Site Preparation	219	acres X	$800	/acre			$175,200
Manual Release	219	acres X	$1320	/acre			$289,080
Reforestation Costs							$606,630
Harvest/Biomass Jobs		Direct Job	91		Direct+Ind	182	
Total Full Time Jobs							**182**
Total Employee-Related Income							**$7,824,152**

Assumptions:

a. Harvest Value Schedules, CA State Board of Equalization, Table 4, Area 7, Tractor, 23"-29.9"dbh

b. Harvest Value Schedules, CA State Board of Equalization, Misc. Harvest Values, Small Sawlogs, 14"-22.9" dbh

Timber Values for 10"-13.9" are $25.00/mbf

Deduction if average volume per acre under 5mbf/ac -$25

Skyline Yarding $30/mbf for 23"-29.9"(25% of Volume) $100/mbf for 14"-22.9"(75% of Volume)

Cost/ac for unit size increases 0% for 400 ac to 20% for 5 ac

Cost/ac for contract length decreases 10% every year after one year

Cost/ac for months of operation decreases 10% for 10 months or more and increases 10% for 4 months or less

Each million board feet harvested supports 6.5 year-around jobs (1 in logging, 4 in sawmill, and 1.5 in US Forest Service employment). In regional economic models of employment for California and the Pacific Northwest, an estimate of one indirect or induced job for every direct timber job is added. All jobs are equivalent to year-around employment.

Table E-3. Economic analysis for alternatives F and G (the service contract economics for alternatives F and G would be the same as for alternatives B-E).

Value	Total Acres =		1342	acres	Low mbf/ac deduction	$0	mbf/ac
PP 23"-29.9" sawtimber[a]	536	mbf x (	$400	/mbf +	$0	/mbf)	$214,400
SP 23"-29.9" sawtimber[a]	44	mbf x (	$400	/mbf +	$0	/mbf)	$17,600
WF-RF 23"-29.9" sawtimber[a]	450	mbf x (	$200	/mbf +	$0	/mbf)	$90,000
DF 23"-29.9" sawtimber[a]	2126	mbf x (	$410	/mbf +	$0	/mbf)	$871,660
IC 23"-29.9" sawtimber[a]	160	mbf x (	$460	/mbf +	$0	/mbf)	$73,600
Total 23"-29.9" sawtimber	3316						
ALL 10"-22.9" sawtimber[b]	8849	mbf x (	$160	/mbf +	$0	/mbf)	$1,415,840
Biomass value when removed	1151	acres x	16.6	tons/acre x	$11.50	/ton =	$219,726
Total Value	**12165**	**mbf**	**9.1**	**mbf/acre**			**$2,902,826**
COSTS	(Assumes Harvesting Sawtimber and Biomass in One Operation)						
Additional move in/out costs							$25,000
Add sawtimber skyline cost	700	mbf x	$76	/mbf =			$53,460
	Average Unit Size =		25	acres		$31	/acre
	Contract Length =		3	years		($62)	/acre
	Months Operation =		5	months		$0	/acre
Acres of 6"-9.9" biomass-tractor	0	acres x (	$309	/acre +	($31)	/acre)	$0
Acres of 3"-9.9" biomass-tractor	1071	acres x (	$352	/acre +	($31)	/acre)	$344,219
Acres of 6"-9.9" biomass-skyline	80	acres x (	$1,500	/acre +	($31)	/acre)	$117,520
Acres of 3"-9.9" biomass-skyline	0	acres x (	$2,000	/acre +	($31)	/acre)	$0
	1151	Biomass Acres					
# of sawtimber loads	12165.0	mbf /			4	mbf/truck =	3041
Additional Haul Cost (4 hr avg)	0	hours/trip x	$75	/hour x	3041	trips	$0
# of biomass loads	1151	acres X	16.6	tons/acre /	25	tons/truck =	764
Haul Cost Biomass	4	hours/trip x	$75	/hour x	764	trips	$229,200
Surface Replacement-sawtimber	12165	mbf x			$6.00	/mbf =	$72,990
Surface Replacement-biomass	1151	acres x	16.6	tons/acre x	$0.67	/ton =	$12,801
Subsoiling Costs	200	acres x	$230	/acre			$46,000
BD Costs	12165	mbf x	$8.18	/mbf			$99,510
Road Construction	17.0	miles x	14,600	/mile			$248,200
Advertised Rate-sawtimber	12165	mbf x	$43.99	/mbf			$535,153
Advertised Rate-biomass	1151	acres x	16.6	tons/acre x	$0.20	/ton	$3,821
Yield Tax	$2,902,826	X	2.9%				$84,182
Scaling Sawtimber	3041	trips	$60	/trip			$182,460
Scaling Biomass	764	trips	$35	/trip			$26,740
Total Cost							**$2,081,256**

Table E-3. Economic analysis for alternatives F and G. (continued).

Net Value								$821,570
						Percent Above Value		28%
Groups:								
Plant	191	acres X	$650	/acre				$124,150
Site Preparation	191	acres X	$800	/acre				$152,800
Manual Release	191	acres X	$1320	/acre				$252,120
Reforestation Costs								$529,070
Total Nonharvest Cost								$1,058,140
Harvest/Biomass Jobs		Direct Job	90.21		801667	Direct+Ind	180	
Total Full-time Jobs								180
Total Employee-related Income								**$7,758,749**

Assumptions:

a. Harvest Value Schedules, CA State Board of Equalization, Table 4, Area 7, Tractor, 23"-29.9"dbh

b. Harvest Value Schedules, CA State Board of Equalization, Misc. Harvest Values, Small Sawlogs, 14"-22.9" dbh

Timber Values for 10"-13.9" are $25.00/mbf

Deduction if average volume per acre under 5mbf/ac -$25

Skyline Yarding $30/mbf for 23"-29.9"(25% of Volume) $100/mbf for 14"-22.9"(75% of Volume)

Cost/ac for unit size increases 0% for 400 ac to 20% for 5 ac

Cost/ac for contract length decreases 10% every year after one year

Cost/ac for months of operation decreases 10% for 10 months or more and increases 10% for 4 months or less

Each million board feet harvested supports 6.5 year-around jobs (1 in logging, 4 in sawmill, and 1.5 in US Forest Service employment). In regional economic models of employment for California and the Pacific Northwest, an estimate of one indirect or induced job for every direct timber job is added. All jobs are equivalent to year-around employment.

Table E-4. Cost of DFPZ maintenance treatments over time at a 4 percent interest rate, including cost of herbicide application at $300 per acre.

Present Value for Treatment	Year in Future of Treatment										
	2	10	12	20	22	30	32	40	42	50	52
Herbicide	$300.00		$300.00		$300.00		$300.00		$300.00		$300.00
$773.65	$277.37		$187.38		$126.59		$85.52		$57.77		$39.03
Mastication		$600.00		$600.00		$600.00		$600.00		$600.00	
$1,073.56		$405.34		$273.83		$184.99		$124.97		$84.43	
Underburning		$250.00		$250.00		$250.00		$250.00		$250.00	
$447.32		$168.89		$114.10		$77.08		$52.07		$35.18	
Interest Rate Annual (percent)	4%		FSM 1900- Planning, 1971.21 Discount Rates								

Notes:

Present Net Value = Future Value / (1 + Interest Rate per Period in decimal) to the Nth power)

Where N is the number of periods in future.

Treatments regimes are from HFQLG FSEIS

Herbicide Cost is the $250 per acre from HFQLG FSEIS inflated by 20% for cost increases which would equal to $300.00 per acre.
Other costs are based on FSEIS and experienced local rates.

Table E-5. Cost of DFPZ maintenance treatments over time at a 4 percent interest rate.

Present Value for Treatment	Year in Future of Treatment										
	2	10	12	20	22	30	32	40	42	50	52
Herbicide	$250.00		$250.00		$250.00		$250.00		$250.00		$250.00
$644.71	$231.14		$156.15		$105.49		$71.26		$48.14		$32.52
Mastication		$600.00		$600.00		$600.00		$600.00		$600.00	
$1,073.56		$405.34		$273.83		$184.99		$124.97		$84.43	
Underburning		$250.00		$250.00		$250.00		$250.00		$250.00	
$447.32		$168.89		$114.10		$77.08		$52.07		$35.18	
Interest Rate Annual (percent)	4%		FSM 1900- Planning, 1971.21 Discount Rates								

Notes:

Present Net Value = Future Value / (1 + Interest Rate per Period in decimal) to the Nth power) where “N” is the number of periods in future.

Treatments regimes are from the HFQLG final supplemental EIS.

Herbicide cost is from the HFQLG final supplemental EIS. Other costs are based on final supplemental EIS and experienced local rates.

Table E-6. Cost of DFPZ maintenance treatments over time at a 7.25 percent interest rate.

Present Value for Treatment	Year in Future of Treatment										
	2	10	12	20	22	30	32	40	42	50	52
Herbicide	$250.00		$250.00		$250.00		$250.00		$250.00		$250.00
$425.29	$217.34		$107.94		$53.60		$26.62		$13.22		$6.57
Mastication		$600.00		$600.00		$600.00		$600.00		$600.00	
$574.07		$297.97		$147.98		$73.49		$36.50		$18.13	
Underburning		$250.00		$250.00		$250.00		$250.00		$250.00	
$239.19		$124.16		$61.66		$30.62		$15.21		$7.55	
Interest Rate Annual (percent)	7.25%		Current Prime Rate for Comparison								

Notes:

Present Net Value = Future Value / (1 + Interest Rate per Period in decimal) to the Nth power), where "N" is the number of periods in future.

Treatments regimes are from the HFQLG final supplemental EIS.

Herbicide cost is from the HFQLG final supplemental EIS. Other costs are based on final supplemental EIS and experienced local rates.

Table E-7. Cost of DFPZ maintenance treatments over time at a 3.1 percent interest rate.

Present Value for Treatment	Year in Future of Treatment										
	2	10	12	20	22	30	32	40	42	50	52
Herbicide	$250.00		$250.00		$250.00		$250.00		$250.00		$250.00
$750.80	$235.19		$173.31		$127.72		$94.12		$69.35		$51.11
Mastication		$600.00		$600.00		$600.00		$600.00		$600.00	
$1,315.38		$442.14		$325.82		$240.10		$176.93		$130.38	
Underburning		$250.00		$250.00		$250.00		$250.00		$250.00	
$548.07		$184.23		$135.76		$100.04		$73.72		$54.33	
Interest Rate Annual (percent)	3.10%		OMB Circlar No. A-94								

Notes:

Present Net Value = Future Value / (1 + Interest Rate per Period in decimal) to the Nth power), where "N" is the number of periods in future.

Treatments regimes are from the HFQLG final supplemental EIS.

Herbicide cost is from the HFQLG final supplemental EIS. Other costs are based on final supplemental EIS and experienced local rates.

Table E-8. Estimated noxious weed cost comparison for French and Scotch broom seedlings.*

<table>
<tr><th>Treatment Method</th><th>Cost</th></tr>
<tr><td>Hand-pull one acre (4 days) of broom seedlings with 25% cover.</td><td>• GS 5 @ $114/day
• $114 x 4 days = $456/acre</td></tr>
<tr><td>Cover could be much higher in some areas.</td><td>• 25% broom cover = $114 x 4days = $456/acre
• 50% broom cover = $114 x 8 days = $912/acre
• 100% broom cover = $114 x 16 days = $1824/acre</td></tr>
<tr><td>Cost to treat 33 acres</td><td>• 25% cover = $456 x 33acres = $15,048
• 100% cover = $1824 x 33 acres = $60,192</td></tr>
<tr><td>Chemical Control Assumptions</td><td>• 1 day to chemically treat 2.5 acres.
• GS 9 @ $220/day
• $88/acre (not including the cost of the material)</td></tr>
<tr><td>Mechanical (brush cutters) Control Assumptions</td><td>• 3 Brush cutters have been purchased and are at FRRD</td></tr>
<tr><td></td><td>• 1day to treat 0.5 acres
• GS 5 @ $114 / day
• 50% cover
• $230 / acre</td></tr>
<tr><td>Back-pack Flamer Control Assumptions</td><td>• 3 backpack flamers have been purchased by the PNF. A Burn Boss needs to be present during treatment.
• GS 5 @ $114 / day
• 50% cover
• $114 / acre
• These cost estimates do not include travel time and vehicle expenses. A twenty percent multiplier will be applied to cover these costs.</td></tr>
<tr><td colspan="2">For alternatives B, D, F the following estimates were made:
<table>
<tr><th>Acres Treated per year</th><th>Treatment Method</th><th>Cost ($)</th></tr>
<tr><td>11</td><td>Mechanical</td><td>2,530</td></tr>
<tr><td>9</td><td>Chemical</td><td>800</td></tr>
<tr><td>10</td><td>Backpack Flamer</td><td>1,140</td></tr>
<tr><td>1</td><td>Hand Pulling</td><td>1,000</td></tr>
<tr><td colspan="2">Total 33 per year</td><td>$5,470</td></tr>
</table>
To cover travel time a 20% multiplier was applied
(5,470 + 1,134 = $6604 / year)
Estimated cost per acre for alternatives B, D, F with the above treatment methods
= $200.12 / acre</td></tr>
<tr><td colspan="2">For alternatives C, E, G the following estimates were made:
<table>
<tr><th>Acres Treated per year</th><th>Treatment Method</th><th>Cost ($)</th></tr>
<tr><td>16</td><td>Mechanical</td><td>3,680</td></tr>
<tr><td>0</td><td>Chemical</td><td>0</td></tr>
<tr><td>15</td><td>Backpack Flamer</td><td>1,710</td></tr>
<tr><td>2</td><td>Hand Pulling</td><td>1,800</td></tr>
<tr><td colspan="2">Total 33 per year</td><td>$7,190</td></tr>
</table>
To cover travel time a 20% multiplier was applied
(7190 + 1,438 = $8628 / year)
Estimated cost per acre for alternatives B, D, F with the above treatment methods
= $261.45 / acre</td></tr>
</table>

Note: Prepared by: Chris Christofferson for the Slapjack Project. Manual control assumptions are based on observations made over the past three field seasons on the Feather River Ranger District. Backpack control assumptions are based on a conversation with Botanist Jim Belscher-Howe on 12/9/05.

Appendix F

Mitigation Measures and Monitoring Strategy

Appendix F
Mitigation Measures and Monitoring Strategy

Table F-1. Slapjack Project design features and mitigation measures.

Resource Concern	Mitigation	Responsible Person(s)	Timeframe
Implement Best Management Practices (BMPs):			
Soils/Fish/ Hydrology / Wildlife	1.1 Planning Process 1.2 Timber Harvest Area Design 1.3 Use of Erosion Hazard Rating (EHR) For Timber Harvest Area 1.4 Use of Sale Area Maps For Designating Water Quality Protection Needs 1.5 Limiting The Operating Period of Timber Sale Activities 1.6 Protection of Unstable Lands 1.8 Streamside Management Zone Designation 1.10 Tractor Skidding Design 1.12 Log Landing Location 1.13 Erosion Prevention And Control Measures During Timber Sale Operations 1.14 Special Erosion Prevention Measures On disturbed Land 1.15 Re-vegetation of Areas Disturbed By Harvest 1.16 Log Landing Erosion Prevention and Control 1.17 Erosion Control On Skid Trails 1.18 Meadow Protection During Timber Harvesting 1.19 Streamcourse Protection 1.20 Erosion Control Structure Maintenance 1.21 Acceptance of Timber Sale Erosion Control Measures Before Sale Closure 1.22 Slash Treatment In Sensitive Areas 1.23 Five-Year Reforestation Requirement 1.25 Modification Of The Timber Sale Contract 2.1 General Guidelines For The Location And Design Of Roads 2.2 Erosion Control Plan 2.3 Timing of Construction Activities 2.4 Stabilization of Road Slope Surfaces and Spoil Disposal Areas 2.5 Road Slope Stabilization 2.6 Dispersion Of Subsurface Drainage From Cut and Fill Slopes 2.7 Control of Road Drainage 2.9 Timely Erosion Control Measures on Incomplete Roads and Streamcourses 2.11 Control of Sidecast Material 2.12 Servicing And Refueling Of Equipment (similar to BMP 7.4 – Oil & Hazardous Substance Spill Contingency Plan and Spill Prevention Control and Countermeasure [SPCC] Plan) 2.13 Control of Construction In Streamside Management Zones (RHCAs) 2.14 Controlling In-channel Excavation 2.15 Diversion Of Flows Around Construction Sites 2.16 Streamcourses On Temporary Roads 2.22 Maintenance of Roads 2.23 Road Surface Treatment To Prevent Loss of Materials	Prep Officer & Timber Sale Administrator (TSA)	Prior & During Treatment

Resource Concern	Mitigation	Responsible Person(s)	Timeframe
	2.24 Traffic Control During Wet Periods		
	2.26 Obliteration or Decommissioning of Roads 5.2 Slope Limitations for Mechanical Equipment Operations 5.3 Tractor Operation Limitation in Wetlands and meadows 5.6 Soil Moisture for Mechanical Equipment Operations 5.7 Pesticide Use Planning Process 5.8 Pesticide Application According to Label Directions and Applicable Legal Requirements 5.9 Pesticide Application Monitoring and Evaluation 5.10 Pesticide Spill Contingency Planning 5.11 Cleaning and Disposal of Pesticide Containers and Equipment 5.12 Streamside Wet Area Protection During Pesticide Spraying 5.13 Controlling Pesticide Drift During Spray Application 6.1 Fire And Fuel Management Activities 6.2 Consideration of Water Quality In Formulating Fire Prescriptions 7.3 Protection of Wetlands 7.4 Oil And Hazardous Substance Spill Contingency Plan And Spill Prevention Control and Countermeasure (SPCC) Plan 7.8 Cumulative Off-site Watershed Effects		
Soils / Fish / Hydrology / Wildlife	The following Contract Provisions will be included in the project Timber Sale Contracts, with corresponding contract provisions in Service Contracts, to protect potentially affected resources. **Wildlife:** CT6.25 - Protection of Habitat of TES Species (10/78): Location of areas needing special measures for protection of animals (or plants) as Threatened, Endangered, or species under the ESA of 1973 and R5 Sensitive Species are shown on map and or discussed in this document. If protection measures prove inadequate, if other such areas are discovered, or if new species are listed on the Endangered Species List, FS may either cancel under CT8.2 or unilaterally modify this contract to provide additional protection regardless of when such facts become known. Discovery of such areas by either party shall be promptly reported to the other party. CT6.313 - Limited Operating Period (1/84): Except when agreed otherwise, Purchaser's operations shall be “limited” as described within this document. CT6.7 - Logs not meeting utilization standards shall be used to meet the Land and Resource Management Plan as amended requirements. Logs should be evenly distributed within the units (stands) to the extent possible. **Hydrology:** CT5.36 - WATER SUPPLY DEVELOPMENT. (9/2004) National Forest water supply locations, access, method of filling trucks, period of water availability and procedures designed to maintain water quality at each location shall be agreed in advance of use. Such use shall at no time reduce water supplies to the level that further use may be detrimental to aquatic resources or other established use. Waterholes and other improvements relating to said water supplies shall be put into condition, prior to expected seasonal periods of precipitation or runoff, to avoid resource damage. Damage to resources at such locations caused by Purchaser's Operations, other than fire suppression activities, shall be repaired by Purchaser in a timely and agreed manner to the extent practicable to restore and prevent further resource damage. CT6.313#- LIMITED OPERATING PERIOD. (9/2004) Except when agreed otherwise, Purchaser's Operations shall be limited as described within this document.	Prep Officer, TSA, Hydrologist, Soil Scientist, Botanist, Fisheries Biologist, Wildlife Biologist	During Contract Prep, and Treatment

Resource Concern	Mitigation	Responsible Person(s)	Timeframe
	CT6.422# - TRACTOR SKIDDING REQUIREMENTS. (9/2004) Unless otherwise agreed, skid road pattern shall be agreed in advance of felling and main skid roads shall be flagged on the ground in advance of felling. Purchaser shall stage-log by felling and skidding Included Timber in two or more separate operations when necessary to prevent undue damage to the resources or residual stand. Needed tractor trails shall be constructed in advance of skidding. Products shall be end-lined as needed to protect resources or residual timber from unnecessary damage. Endlining shall not be required for distances in excess of 75 feet. The number of chokers shall be limited as necessary to avoid unnecessary damage to resources or residual timber. By agreement, tractors may be used to separate products to prevent stain. CT6.5 - STREAMCOURSE PROTECTION. (9/2004) Unless otherwise agreed in writing, wheel or track laying equipment shall not operate within "Buffer Strips" except as necessary for fire suppression activities. “Buffer Strips” are areas marked on the ground or are within the distances identified on the Sale Area Map measured from the apparent high water mark of streamcourses. Boundaries of Buffer Strips may be modified by agreement in writing to meet unforeseen operating conditions. Culverts, bridges, or other suitable structures shall be required on skid roads and trails only at points where it is necessary to protect Stream courses. The type of crossing structures, method of installation and removal shall be determined by agreement. Purchaser in accordance with CT6.6 - Erosion Prevention and Control, shall remove such structures and associated fills. Damage to Stream course or Buffer Strips caused by unauthorized Purchaser's Operations shall be repaired by Purchaser in a timely and agreed manner to the extent practical as determined by Forest Service to restore and prevent further damage to Stream courses. CT6.6 - EROSION PREVENTION AND CONTROL. (9/2004) Erosion prevention and control work, including Streamcourse protection, required by CT6.5 and BT6.6 shall be completed within 15 calendar days after skidding operations related to each landing are substantially completed or after Forest Service designation on the ground of work where such designation is required hereunder. Said time limit shall be exclusive of full days lost in Purchaser's Operations due to causes beyond Purchaser's control. Such on the ground designation shall be done as promptly as feasible unless it is agreed that the location of such work can be established without marking on the ground. After September 15 and as long thereafter as operations continue the work shall be done as promptly as practicable. Damage resulting from Purchaser's Operations due to failure to perform required work shall be repaired by Purchaser. CT6.601 - VEGETATIVE SOIL STABILIZATION. (9/2004) Where soil has been disturbed by Purchaser's Operations and the establishment of vegetation is needed to minimize erosion, Purchaser shall take appropriate measures normally used to establish an adequate cover of grass or other vegetation acceptable to Forest Service or take other agreed stabilization measures. Forest Service shall designate on the ground such disturbed areas annually as logging and Temporary Road construction are completed. Forest Service upon request shall provide advice as to soil preparation and the application of suitable seed mixtures, mulch and fertilizer and the timing of such work. In no event shall Purchaser be required to treat more acres than that shown in the legend of Sale Area Map. CT6.602 - SPECIAL EROSION PREVENTION MEASURES. (9/2004) Purchaser shall give adequate treatment by spreading slash or wood chips or by agreement giving other treatment to portion of tractor roads, skid trails, landings, cable yarding corridors, tractor-end lined corridors and Temporary Road fills where necessary to supplement other erosion prevention measures required elsewhere in this contract. In no event shall Purchaser be required to treat more acres than that shown in the legend of Sale Area Map. The specific locations to be treated shall be designated on the ground by Forest Service. These special erosion prevention measures are to be done within the same date and time periods as required in CT6.6.		

Resource Concern	Mitigation	Responsible Person(s)	Timeframe
	CT6.603 - SOIL SCARIFICATION. (9/2004) In addition to meeting the requirements of BT6.63 and BT6.64, Purchaser shall scarify the following areas; unless otherwise agreed: a) Traveled Way of National Forest System roads used by Purchaser and listed in the legend of Sale Area Map. b) Roadbeds of any Temporary Roads used for log hauling by Purchaser. c) Landings or portions thereof located outside Roadbed limits of National Forest System roads not designated for scarification. Scarification shall be to a depth of 6 inches, with intervals between striations not to exceed 12 inches, unless otherwise agreed. CT6.606# - TILLAGE OF LANDINGS. (9/2004) In addition to meeting the requirements of BT6.64, unless otherwise agreed in writing, tillage shall be required on all landings. Purchaser shall not be required to till more than acres under this provision. Tillage shall be accomplished by equipment that will lift and fracture the soil by vertical and lateral shattering, leaving soil loosened through the full width and depth of the compacted layer with the topsoil remaining substantially in place rather than being inverted. Tillage shall extend to a depth of 24 inches on landings. Agreement in writing may be made to a lesser depth if rocks or other limiting site conditions are encountered. Tillage shall be limited to periods when soil dryness will result in crumbled soil, avoiding the formation of large clods. Purchaser and Forest Service shall agree in writing on the timing of completion of such work to coordinate with desirable soil moisture conditions. CT6.607# - TILLAGE OF MAIN SKID ROADS AND TRACTOR ROADS. (9/2004) In addition to meeting the requirements of B(T)6.65 and C(T)6.422# - Tractor Skidding Requirements, unless otherwise agreed in writing, main skid roads and tractor roads used by Purchaser shall be tilled when designated by Forest Service. No more than acres shall be designated. Main skid roads and tractor roads are those, which are flagged on the ground in advance of felling. Tillage shall be accomplished by equipment that will lift and fracture the soil by vertical and lateral shattering, leaving the soil loosened through the full width and depth of the compacted layer with the topsoil remaining substantially in place rather than being inverted. Tillage shall be to a depth of inches on main skid roads and tractor roads. Agreement in writing may be made to a lesser depth if rocks or other limiting site conditions are encountered. Tillage shall be limited to periods when soil dryness will allow crumbled soil, avoiding the formation of large clods. Purchaser and Forest Service shall agree in writing on the timing of completion of such work to coordinate with desirable soil moisture conditions. CT6.608# - TILLAGE OF TEMPORARY ROADS. (9/2004) In addition to meeting the requirements of BT6.63 and BT6.631, all temporary roads used by Purchaser shall be tilled, unless otherwise agreed in writing. Purchaser shall not be required to till more than acres under this provision. Tillage shall be accomplished by equipment that will lift and fracture the soil by vertical and lateral shattering, leaving soil loosened through the full width and depth of the compacted layer with the topsoil remaining substantially in place rather than being turned over. Tillage shall extend to a depth of 24 inches on temporary roads. Forest Service may agree in writing to lesser depths when excessive rock or other limiting site conditions are encountered. Rice straw, or certified weed free straw, will be used to mulch the beginning of the tilled roadway that can be visually seen from the closure point (but not to exceed feet in length). Tillage shall be limited to periods when soil dryness will result in crumbled soil avoiding formation of large clods. Purchaser and Forest Service shall agree in writing on the timing of completion of such work to coordinate with desirable soil moisture conditions.		

Resource Concern	Mitigation	Responsible Person(s)	Timeframe
	The following B clauses apply: BT 6.61 MEADOW PROTECTION BT 6.62 WETLAND PROTECTION BT 6.63 TEMPORARY ROADS BT 6.65 STREAM COURSE PROTECTION BT 6.6 EROSION PREVENTION AND CONTROL		
Soils / Fish / Hydrology	To minimize detrimental soil compaction, restrict ground based logging operations on slopes greater than 35 percent. For units with mastication treatments greater than 35 percent, logging operations will be limited to 45 percent, and equipment will not turn on slopes greater than 35 percent. Ground based harvest operations would occur when the upper 8 inches of the soil is essentially dry, the ground is frozen to a depth of 5 inches or snow depth is at least 18 inches or "machine compacted" to 8 inches. Soil is defined as "dry" when the upper 8 inches is not sufficient to allow a soil sample to be squeezed and hold its shape, or crumbles when the hand is tapped.	Prep Officer, TSA & Soil Scientist	During Sale, Design, Prep and Treatment
Soils / Hydrology	In mechanical mastication units, prohibit mechanical equipment operations until soils are dry to a depth of 4 inches for low ground pressure rated equipment, and to a depth of 10 inches for high ground pressure rated equipment, to minimize soil compaction.	District Culturist, Contract Administrator	During Contract Prep & Contract Admin.
Soils / Hydrology / Noxious Weeds	Where mulch is needed for ground cover and slash or wood chips are not available, certified weed-free straw or rice straw will be used. Utilize road surface gravel from weed-free sources. Pre-inspect gravel sources for the presence/absence of noxious weeds prior to utilization of gravel from those sources.	TSA & Soil Scientist, Botanist	During & Post Thinning and Road work.
Soils / Hydrology	Avoid benched skid trails and temporary roads whenever possible	Prep Officer & TSA	During Layout & Treatment
Soils / Hydrology	Restrict skidding equipment to designated skid trails, to minimize detrimental soil compaction, unless through consultation with the physical scientist it was determined that departure from skid trails was not likely to impair the soil. Skid trail spacing would generally average 120 feet center to center when trails are parallel. The direction is to limit trail and landing density to less than 15% of a harvest unit. Low ground pressure equipment and grapple pile techniques would be used to prevent detrimental compaction. Keep skid trail grades as gentle as possible, avoid straight up and down the slope skidding where possible.	Soil Scientist & TSA	During Treatment
Soils / Hydrology	Utilize existing landings where possible. Locate all new landings off of main public travel corridors and outside of RHCAs. No new landings in RHCAs would be constructed unless that construction would result in less impact than the construction of a new landing outside of the RHCA, as determined by a Hydrologist, Soil Scientist, Botanist, or Fisheries Biologist on a case-by case basis.	Soil Scientist, Hydrologist, Fisheries Bio, and TSA	During Treatment

Resource Concern	Mitigation	Responsible Person(s)	Timeframe
Soils / Hydrology	Landing locations shall be carefully planned to minimize the number needed, and will consider site-specific factors such as topography, watershed and other resource protection concerns, and contract operational needs. Where site-specific resource protection concerns are not otherwise limiting, the number of landings should not exceed 1 landing per 30 acres. Unless otherwise agreed to by physical scientist and sale administrator, landings, skid trail approaches to landings (to a distance of 200 ft), and temporary roads that are constructed would be subsoiled through the full depth of compaction to restore soil porosity. In units greater than maximum standard for a compaction, all new skid trails and landings would be subsoiled. Revegetate disturbed sites. Apply mulch to landings as well as any other disturbances. Landings would be subsoiled prior to application of the mulch. For units below the effective minimum ground cover, small woody debris would remain to increase ground cover.	Prep Officer, Soil Scientist, Hydrologist, Fuels Officer, & TSA	During Project Design , Contract Prep, & Treatment
Soils / Hydrology	Skid trails with a gradient greater than 15% slope would be mulched, or water bars would be constructed at the spacing specified for High Erosion Hazard Rating (EHR) soils. When skidding and hauling operations are nearing completion, the TSA and District Hydrologist would evaluate the landings and skid trails in the affected units. They would determine the most effective and feasible treatment method compatible with the fuel reduction objectives within the DFPZ. The TS and service contract, prospectus, and any appraisal involving these units should reflect the required work.	Prep Officer, Soil Scientist, Hydrologist, Fuels Officer, & TSA	During Project Design , Contract Prep, & Treatment
Temporary Roads			
Soils / Hydrology	• Limit the amount of temporary road construction by maximizing the skidding distance. • Minimize the length and width of the roads. • Avoid unstable areas where there is potential for mass soil erosion. • If a mechanical thinning contractor who has built a temp road, is directed to not decommission the road because of expected use for post-thinning activities such as prescribed fire treatments, the benefiting function will implement and fund the decommissioning of the road.	Prep Officer, Soil Scientist, TSA, & culturist	Prior, During, & Post Treatment
System Roads			
Soils / Hydrology	• Require a dust palliative on all primary system roads. • Water may be used to reactivate dust palliatives on all roads. • Where streams are the sole water source, drafting would be allowed until stream flows reach 2 cfs. Below 2 cfs, drafting would only be allowed in previously developed off-site water impoundments and according to guidelines as outlined in the Plumas National Forest Land and Resource Management Plan (LRMP)	Prep Officer, Soil Scientist, TSA, & culturist	Prior, During, & Post Treatment
Hydrology / Riparian Habitat Conservation Areas	Apply RHCA widths for perennial, intermittent, and ephemeral streams. RHCA widths shall be consistent with Riparian Management Objectives (RMO) and Scientific Analysis Team (SAT) guidelines set forth in the HFQLGFRA final EIS Appendix L. Treatments to achieve fuel or timber objectives within RHCAs are required to satisfy Riparian Management Objectives. (A description of how this project meets the RMOs is contained in the project file.) Include seasonal wet meadow flat areas and vernal pools with RHCAs to eliminate potential negative impacts to certain Threatened, Endangered, Sensitive (TES) and special interest plants and wildlife.	Prep Officer, Hydrologist, TSA	Prior, During, & Post Treatment
Soils / Hydrology / RHCAs (Burning)	Proposed underburn ignitions shall be started above the RHCA, applying fire along contour strips, and then allowing the fire to 'back' downhill on its own, using spot ignition to keep the line of fire relatively straight above the RHCA boundary.	Soil Scientist, Fish Biologist, Botanist, Hydrologist & Fuels Officer	Post Treatment, During Prescribed Fire Operations

Resource Concern	Mitigation	Responsible Person(s)	Timeframe
	During implementation of under burning, no ignition shall occur within RHCAs. Fire shall be allowed to back into an RHCA to achieve low intensity burning. All burning shall be conducted on permissive burn days, within air quality constraints. Fire lines (control lines) include roads, skid trails, natural barriers and hand or machine lines (ATV or tractor). Hand line construction will occur within RHCAs, where it is necessary to enter the RHCA to provide for logistical boundaries in underburning the DFPZ. To protect against accelerated erosion and hydrophobicity, to maintain long-term soil productivity, and protect sensitive plants, specific guidelines for ground cover should be applied during the planning and implementation of fuels treatments.		
Hydrology / RHCAs	**RHCA Treatment in Plantations:** RHCAs in plantations can be treated in accordance with SAT Standard and Guideline TM-3 from the HFQLG FEIS. Protection widths were determined and based on the following: **Mastication and Harvest less than 35% slope with stable streams:** RHCAs: (fish bearing) buffer will be 50-feet or extent of riparian vegetation RHCAs: (non-fish bearing) buffer will be 25-feet or extent of riparian vegetation **Harvest Plantation Units less than 35% slope with unstable streams:** RHCAs: (fish bearing) buffer will be 150-feet or extent of riparian vegetation of streambanks RHCAs: (non-fish bearing) buffer will be 50-feet or extent of riparian vegetation of streambanks SMZs: PNF LRMP guidelines, Appendix M Ground-disturbing mechanical equipment will not be allowed within these new designated protection zones. In harvest units, equipment may reach into RHCAs in the no-tractor equipment zone. Trees in streambank areas will be retained to ensure continued bank stability **The following additional mitigations apply to specific units in the Slapjack Project:** In the following treatment units that do not meet soil quality standards for detrimental compaction (over 15% of the stand exclusive of system roads, designated landings and skid trails has a greater than 10% reduction in soil porosity compared to neighboring undisturbed areas), additional mitigation measures will apply: DFPZ units 52, 53, 152, 402, 9401; Group selection areas 4, 5 and 15. These measures are: • Skidding will be restricted to existing skid trails. • Landings and skid trail approaches within 200 feet of landings will be subsoiled. In those twenty-two DFPZ units (4, 5, 6, 26, 29n, 29s, 32, 47, 48, 52, 63, 64, 82, 84, 85, 91, 96, 97, 98, 159, 229, 284); three group selection areas (26, 27 and 43); and individual tree selection unit 25 that do not meet soil quality standards for large down woody debris, logs that do not meet utilization standards will be evenly distributed within the unit to achieve the standard in accordance with wildlife standards. In group selection area 27 that does not meet the standard for fine organic material, mitigation will occur through natural recovery.	Prep Officer, Hydrologist, and TSA	Prior, During, & Post Treatment

Resource Concern	Mitigation	Responsible Person(s)	Timeframe
Hydrology / Fish / Wildlife (Roads)	The following site-specific mitigations related to roads specified for use in the Slapjack Project have been identified. Two roads (19N00, 20N25) have been identified as roads that are creating egregious resource damage, to the extent that a delay in their closure would result in unacceptable and irretrievable impacts to resources. Portions of these roads are designated for immediate closure and rehabilitation, as allowed under the terms of the OHV Route Designation Process. The other roads described below (19N16B, 20N04B) are not presently causing egregious resource damage, but have special mitigation needs, which are listed. **Road 19N00: Milk Ranch Meadow, NW ¼ of SW ¼ Sec. 2, T18N R7E** • Decommission approximately ¼ mile of road. • Restore gully system, using check dams or cuir logs. • Divert drainage; redesign road bed to control drainage from through-cut. • Restore wetland by removing road fill in seep/spring and allowing hydrophytic vegetation to regenerate. **Road 19N16B: Near Indian Creek, NW ¼ of Sec. 21, T19N R7E** • Close road and re-waterbar after use. • Refill and rip-rap fill failures. • Replace shotgun culvert to remove drop and allow fish passage. • **DO NOT** subsoil landing; mulch and allow natural regeneration. **Road 20N04B: Adjacent to Gophner Ravine, NE ¼ of Sec. 5, T19N R8E** • DO NOT RECONSTRUCT OR MAINTAIN FOR SLAPJACK PROJECT. • Relocate access to units • Decommission road. **Road 20N05: Hampshire Creek marsh, SW ¼ of NE ¼ Sec.1, T19N R7E** • Decommission road. • Restore gully system with check-dams, cuir logs, or other methods. • Remove erodible fill.	Engineering Rep, TSA, Hydrologist, Wildlife Biologist	During project design, contract prep, and Administration
Rare Plants	**REVEGETATION OF DISTURBED AREAS WITH NATIVE SPECIES:** All activities that require seeding or planting will need to use only locally collected native seed sources. Examples of proposed activities that may need to be seeded are road closures, landings, or skid trails. This will implement the USFS Region 5 policy (Stewart, 1994) that directs the use of native plant material for revegetation and restoration for maintaining "the overall national goal of conserving the biodiversity, health, productivity, and sustainable use of forest, rangeland, and aquatic ecosystems." An alternative method of erosion control where erosion is a particular concern and where adequate sources of local native seed are not available is to use weed-free seed or weed-free straw with seed-heads of non-persistent cereal grains such as white oats. This will provide erosion control until native species can naturally seed in. Use K-V or other funds as available for collecting and planting native grasses for revegetation of disturbed areas.	Prep Officer, Botanist, and TSA	Prior, During, & Post Treatment
Rare Plants: *Senecio layneae* Prescribed Burn	There is approximately 0.5 acre of the Threatened plant *Senecio layneae* in a treatment unit proposed for underburn. Specific mitigations will apply for burn timing, fireline construction, and adjacent treatments. (See appendix D of Botany BA/BE.)	Prep Officer, Botanist, and TSA	Prior, During, & Post Treatment

<table>
<tr><th>Resource Concern</th><th>Mitigation</th><th>Responsible Person(s)</th><th>Timeframe</th></tr>
<tr><td>Rare Plants</td><td>The following controlled areas will be applied to protect known occurrences of rare plants:

<table><tr><th>Unit</th><th>Common name</th><th>Mitigation</th></tr><tr><td>4</td><td>Butte County fritillary</td><td>CA for pile burning on plants</td></tr><tr><td>6</td><td>Humboldt lilly</td><td>CA for herbicide RX</td></tr><tr><td>11</td><td>Humboldt lilly</td><td>CA for piles and herbicide RX</td></tr><tr><td>13</td><td>Humboldt lilly</td><td>CA for herbicide RX</td></tr><tr><td>13</td><td>Humboldt lilly</td><td>CA for nox weed herbicide</td></tr><tr><td>19</td><td>Tooth wort</td><td>CA for pile burning on plants</td></tr><tr><td>19</td><td>Tooth wort</td><td>CA for pile burning on plants</td></tr><tr><td>26</td><td>Humboldt lilly</td><td>CA for piles and herbicide RX</td></tr><tr><td>30</td><td>Mutant tanoak</td><td>CA for equipment**</td></tr><tr><td>32</td><td>Butte County fritillary</td><td>CA for piles and herbicide RX</td></tr><tr><td>34</td><td>Sanborn's onion</td><td>CA for pile burning on plants</td></tr><tr><td>34</td><td>Humboldt lilly</td><td>CA for pile burning on plants</td></tr><tr><td>36</td><td>Humboldt lilly</td><td>CA for piles and herbicide RX</td></tr><tr><td>38</td><td>Tooth wort</td><td>CA for herbicide RX</td></tr><tr><td>41</td><td>Humboldt lilly</td><td>CA for piles and herbicide RX</td></tr><tr><td>45</td><td>Butte County fritillary</td><td>CA for pile burning on plants</td></tr><tr><td>60</td><td>Tooth wort</td><td>CA for pile burning on plants</td></tr><tr><td>61</td><td>Butte County fritillary</td><td>CA for pile burning on plants</td></tr><tr><td>63</td><td>Tooth wort</td><td>CA for pile burning on plants</td></tr><tr><td>63</td><td>Butte County fritillary</td><td>CA for pile burning on plants</td></tr><tr><td>63</td><td>Butte County fritillary</td><td>CA for pile burning on plants</td></tr><tr><td>63</td><td>Humboldt lilly</td><td>CA for pile burning on plants</td></tr><tr><td>78</td><td>Butte County fritillary</td><td>CA for nox weed herbicide</td></tr><tr><td>81</td><td>Butte County fritillary</td><td>CA for pile burning on plants</td></tr><tr><td>84</td><td>Butte County fritillary</td><td>CA for pile burning on plants</td></tr><tr><td>84</td><td>Humboldt lilly</td><td>CA for pile burning on plants</td></tr><tr><td>91</td><td>Northern sierra daisy</td><td>CA for piles and herbicide RX</td></tr><tr><td>129</td><td>Humboldt lilly</td><td>CA for pile and nox herbicide</td></tr><tr><td>138</td><td>Humboldt lilly</td><td>CA for nox weed herbicide</td></tr><tr><td>184</td><td>Butte County fritillary</td><td>CA for nox weed herbicide</td></tr><tr><td>184</td><td>Humboldt lilly</td><td>CA for nox weed herbicide</td></tr><tr><td>198</td><td>Butte County fritillary</td><td>CA for pile burning on plants</td></tr><tr><td>505</td><td>Butte County fritillary</td><td>CA for pile burning on plants</td></tr><tr><td>505</td><td>Butte County fritillary</td><td>CA for pile burning on plants</td></tr><tr><td>506</td><td>Tooth wort</td><td>CA for pile burning on plants</td></tr><tr><td>531</td><td>Tooth wort</td><td>CA for pile burning on plants</td></tr><tr><td>879 & 80</td><td>Mosquin's clarkia</td><td>CA for nox weed herbicide</td></tr><tr><td></td><td>Ahart's sulfur-flowered buckwheat</td><td>CA for herbicide RX</td></tr></table>
CONTROL AREAS (CA)
1.CA Pile burning on plants- control areas only for pile placement post harvest.
2. CA Herbicide RX - Sensitive and Special Interest species will have a 50 ft buffer from herbicide applications.
3. CA for equipment**- No equipment in the mutant tan-oak exclosure.</td><td>Prep Officer, Botanist, and TSA</td><td>Prior, During, & Post Treatment</td></tr>
<tr><td>Weeds</td><td>The SMRs are based on the priorities established in FSM 2081.2 which states “where funds and other resources do not permit undertaking all desired measures, address and schedule noxious weed prevention and control in the following order:

First Priority: Prevent the introduction of new invaders,

Second Priority: Conduct early treatment of new infestations, and

Third Priority: Contain and control established infestations.”</td><td>District Botanist</td><td>Post Underburning</td></tr>
</table>

Resource Concern	Mitigation	Responsible Person(s)	Timeframe
	1. Prevention/Cleaning: Require all off-road equipment and vehicles (Forest Service and contracted) used for project implementation to be weed-free. Clean all equipment and vehicles of all attached mud, dirt and plant parts. This will be done at a vehicle washing station or steam cleaning facility before the equipment and vehicles enter the project area. Cleaning is not required for vehicles that will stay on the roadway. Also, all off-road equipment must be cleaned prior to leaving areas infested with noxious weeds. 2. Prevention/Road Construction, Reconstruction, and Maintenance: All earth-moving equipment, gravel, fill, or other materials need to be weed free. Use onsite sand, gravel, rock or organic matter where possible. 3. Prevention/Revegetation: Use weed-free equipment, mulches, and seed sources. Avoid seeding in areas where revegetation will occur naturally, unless noxious weeds are a concern. Save topsoil from disturbance and put it back to use in onsite revegetation, unless contaminated with noxious weeds. All activities that require seeding or planting will need to use only locally collected native seed sources. Plant and seed material should be collected from as close to the project area as possible, from within the same watershed and at a similar elevation whenever possible. Persistent non-natives such as timothy, orchardgrass, or ryegrass will be avoided. This will implement the USFS Region 5 policy that directs the use of native plant material for revegetation and restoration for maintaining "the overall national goal of conserving the biodiversity, health, productivity, and sustainable use of forest, rangeland, and aquatic ecosystems". 4. Prevention/Staging Areas: Do not stage equipment, materials, or crews in noxious weed infested areas where there is a risk of spread to areas of low infestation. 5. Small infestations identified during project implementation will be evaluated and hand treated or "flagged and avoided" according to the species present and project constraints. If larger infestations are identified after implementation, they should be isolated and avoided with equipment (and equipment washed as in # 1 above).		
Weeds	The following prevention measures will be implemented for the Slapjack Project. 1. Clean all ground disturbing equipment, such as masticators, harvesters, and other off-road equipment before entering National Forest System land. 2. Use weed free fill and mulch. 3. Avoid staging equipment on or immediately adjacent to any of the identified noxious weed sites. 4. Within mechanical treatment units, exclude all equipment from known infestations. A 25 foot "No Equipment" buffer will be placed around infestations. These areas will be identified on project maps and on the ground with day-glow orange noxious weed flagging. 5. All equipment operating within units designated as "infested" shall be cleaned and inspected prior to moving to an "uninfested" unit. 6. Mature broom will be killed with hand held brush cutters. Treatments will occur in the fall when plants are water stressed. Plants will be left in place and pile burned the following fall. Regrowth and seedlings will be killed with back-pack torches, herbicides, and follow up underburns. Seedlings must be killed prior to seed set. 7. Fireline construction with bull-dozers will avoid all known infestations of broom. 8. Treat barbed goatgrass by hand pulling, and string-trimmers.	Prep Officer, Botanist, and TSA	Prior, During, & Post Treatment

<table>
<tr><th>Resource Concern</th><th>Mitigation</th><th>Responsible Person(s)</th><th>Timeframe</th></tr>
<tr><td>Weeds</td><td>The following units are infested with Scotch, French, or Spanish broom. Controlled areas will be applied to control the spread of noxious weeds:</td><td>Prep Officer, Botanist, and TSA</td><td>Prior, During, & Post Treatment</td></tr>
<tr><td></td><td><table><tr><th>Unit</th><th>Mitigation</th></tr><tr><td>25</td><td>CA for equipment</td></tr><tr><td>30</td><td>CA for equipment</td></tr><tr><td>38</td><td>CA for equipment</td></tr><tr><td>78</td><td>CA for equipment</td></tr><tr><td>129</td><td>CA for equipment</td></tr><tr><td>229</td><td>CA for equipment</td></tr><tr><td>329</td><td>CA for equipment</td></tr><tr><td>429</td><td>CA for equipment</td></tr><tr><td>991</td><td>CA for equipment</td></tr><tr><td>29B</td><td>CA for equipment</td></tr><tr><td colspan="2">CA Equipment - These areas are infested with Scotch and French Broom.</td></tr></table></td><td></td><td></td></tr>
<tr><td>Snags and Large Down Wood</td><td>Within westside vegetation types, generally retain an average over the treatment unit of 10-15 tons of large down wood per acre. In westside mixed conifer and ponderosa pine types, retain four of the largest snags per acre. In the red fir forest type, retain six of the largest snags per acre. Use snags larger than 15 inches DBH to meet the above guidelines.</td><td>Prep Forester TSA, Wildlife Biologist</td><td>During Contract Prep and implement ation</td></tr>
<tr><td>Wildlife: CA red-legged frog</td><td>Alternatives C and G - LOP for GS, DFPZ and ITS from October 15, or first wetting rain, until April 15 for known California red-legged frog sites. This includes a 500-foot buffer around known California red-legged frog populations and a 300 foot buffer around streams within the dispersal area of known site, and a 150-foot buffer in the watershed of the known population.

Alternative B, D, E or F - LOP for herbicide application from October 15, or first wetting rain, until April 15 for known California red-legged frog sites. This includes a 500-foot buffer around known California red-legged frog populations and including a 300-foot buffer around streams within the water shed and dispersal area. RHCAs will generally be avoided.</td><td>District Wildlife Bio, Prep Officer & TSA.</td><td>During sale Layout & Logging</td></tr>
<tr><td>Wildlife: Foothill yellow-legged frog</td><td>Appropriate LOPs would be put in place for foothill yellow-legged frog if individuals are located. This includes a 500-foot buffer around known foothill yellow-legged frog populations.</td><td>District Wildlife Bio, Prep Officer & TSA.</td><td>During sale Layout & Logging</td></tr>
<tr><td>Wildlife: California spotted owl</td><td>According to HFQLG Act, spotted owl PACs cannot be entered into by resource management activities (DFPZ construction, groups, individual tree selection) including road access from March 1 through August 31 within ¼ mile of designated activity centers. LOPs may be added or modified for this project by the district wildlife biologist. Stand prescriptions may be adjusted as well (an example might be to have no harvest around the nest tree, etc.). New Protected Activity Center (PAC) and Home Range Core Area (HRCA) will be created if a new territory is discovered. If a nest or pair is found, project activities will be modified to avoid impacts to owl species. LOPs are proposed in the following units. LOPs may affect access to other treatment units not listed below.

Unit 531, Group 12g, Road 18N01, PAC YU004, T18N R6E Sec. 22

Unit 527, Roads 18N11, PAC YU004, T18N R6E Sec. 22

Unit 524, Group 162g, Road 19N00, PAC YU003, T18N R7E Sec. 3

Unit 542, Groups 102g and 103g, Road YC110, PAC YU009, T19N R 7E Sec. 13

Unit 517, Groups 61g and 62g, Road 19N16, PAC YU0014, T18N R6E</td><td>District Wildlife Bio, Prep Officer & TSA.</td><td>During sale Layout & Logging</td></tr>
</table>

Resource Concern	Mitigation	Responsible Person(s)	Timeframe
	Sec. 21 Unit 60, Group 81g, Road 20N24, PAC BU019 T 18N. R7E. Sec. 2 Unit 125, Mastication (4 acres), PAC YU0024, T18N R6E Sec. 30 Unit 26 (Experimental Forest), Road 19N25, PAC YU0024, T18N R6E Sec. 30 Unit 47, Road 19N07, PAC BU039, T19N R6E Sec. 8		
Wildlife: northern goshawk	Appropriate LOPs would be applied if individuals or nests are located. Surveys would be conducted prior to project implementation and new PACs created if a new territory is discovered.	District Wildlife Bio, Prep Officer & TSA.	During sale Layout & Logging
Wildlife: Pacific fisher	Appropriate LOPs would be applied if individuals or dens are located. If a fisher birthing and kit rearing den is located, protection buffers consisting of 700 acres of the highest quality habitat in compact arrangement surrounding the den site in which a LOP from March 1 through June 30 will be employed.	District Wildlife Bio, Prep Officer & TSA.	During sale Layout & Logging
Wildlife: Bats	If a roost is found, project activities will be modified to avoid impacts to bat species or a LOP (no activity May 15 to August 15, or as otherwise determined) will be applied during the breeding season. The District Wildlife Biologist will be contacted if any suspected or known bat roosts are located during project activities. If a roost is found, do not pile slash, from groups that are proposed to be burned (burn piles), within RHCAs, especially aspen stands and associated buffers.	District Wildlife Bio, Prep Officer & TSA.	During sale Layout & Logging
Wildlife: northwestern pond turtle	Seasonal restrictions on treatment would apply to the following units: Units 80, 82, and 879 (Mastication; T20N R5E Sec 15) and Units 81 and 81S (Group Selection, T20N R5E Sec 15). Unit 81 would be dropped in Alternative G. The LOP affects all of the units because road access to the units is beside the pond. There are no herbicides proposed in the area. The following LOPs apply: 1. Seasonal restrictions for gravid females (carrying eggs), moving inland to nest in June to July. LOP would apply to a 400-meter buffer around the pond from June 1 through July 31. 2. Seasonal restriction for juveniles is from March to April, although some leave in the nest in September (Holland 1985). LOP would include a 400 meter buffer around the pond from March 1 through April 31.	District Wildlife Bio, Prep Officer & TSA.	During sale Layout & Logging
Wildlife	If management objectives cannot be met by implementing the LOPs identified, a qualified wildlife biologist will be consulted to determine more specific areas and kinds of activities that may be pursued. The biologist may recommend removing LOPs, if sufficient information is provided by additional surveys or new information arises.	District Wildlife Bio, Prep Officer & TSA.	During sale Layout & Logging
Wildlife	If potential raptor nests, large stick nests, or signs of active denning are observed in or near trees that are designated for removal, the occurrence and location should be reported to a wildlife biologist to determine the need for further review. During marking of the timber sale, potential raptor nest trees will be identified and reported to the District Wildlife Biologist.	District Wildlife Bio, Prep Officer & TSA.	During sale Layout & Logging
Fuels / Air Quality	The following operating procedures are from the HFQLG final EIS (1999) and the SNFPA final EIS (2001): 1. Mitigate dust from project activities by including standard dust abatement requirements in sale and project contracts. 2. Conduct prescribed burns when favorable smoke dispersal is forecasted, especially near sensitive Class I areas. 3. Use appropriate smoke modeling software to predict smoke dispersion. 4. Minimize smoke emissions by following Best Available Control Methods. 5. Avoid burning on high visitor days and notify the public before burning.	District Fuels Officer	Before and During Prescribed Fire Treatment.

Resource Concern	Mitigation	Responsible Person(s)	Timeframe
	6. Consider alternatives to burning. 7. Incorporate burn plan data into appropriate modeling software. 8. Comply with Title 17 of the 2004 California air pollution control laws and interim air quality policy and local smoke management programs. Follow the Memorandum of Understanding on Prescribed Burning with the California Air Resources Board.		
Fuels / Air Quality	Burning permits would be acquired from the Butte County and Feather River Air Quality Management Districts. The Air Quality District would determine days when burning is allowed. The California Air Resources Board (CARB) provides daily information on "burn" or "no burn" conditions. Burn plans will be designed and all fuel reduction burning will be implemented in a way to minimize emissions. Prescribed fire implementation will coordinate daily and seasonally with other burning permittees both inside and outside the forest boundary to help meet air quality standards**.**	District Fuels Officer	During Prescribed Fire Treatment Activities.
Road Management	There are eight roads on private property that would be needed to access parts of the project. Two will be obtained through a cost share agreement and the other six may be obtained through easements or license agreements. Contractors will need to obtain a written waver from Yuba County in order to use Yuba County Road 129 for loads greater than the posted 22-ton load limit.	Engineering Rep, Contract Prep Officer, TSA	During project design, Contract Prep & Admin..

Road No.	Township / Range Section	Miles	Access Requirements	Owners
U1463	19/7 S13	0.3	Group selection unit 542	Siller Bros
U1209	19/6 S3	0.1	North end DFPZ unit 61 (Heritage precludes alternate access)	Dave Dorn
20N14	20/7-B S36-31	0.2	Big Hill/Weed point Units Include with Cost Share Supplement	Soper Wheeler
Temp	18/7/ S3	100 ft	DFPZ unit 12	Max Doner
U1544	18/7 S11	1.2	DFPZ units 11 and 525	Chy Corp
Private road	18/7 S33	0.7	DFPZ units 84 and 284	Chy Corp
Temp	19/7 S20	0.1	DFPZ unit 229	Thomas Fawcett
20N22 20N53	20/6 S14.23	13	DFPZ unit 78 Include with Cost Share Supplement	SPI

Table F-2. Best Management Practices for herbicide use (alternatives B, D, E, and F).

BMP 5-7	Pesticide Use Planning Process
	The ID Team identified sensitive soils, potential and active unstable slope areas and streamside buffer zones. They evaluated soil and watershed responses to the proposed herbicide application and provided criteria for identifying sensitive areas to be avoided or needing additional protection. Specific mitigation measures for these areas are documented in the following BMPs. They have also developed site-specific monitoring plans for soil and water quality. The interdisciplinary process has allowed the team to assess the practicality of treatments, assess the degree of risk involved and set forth means of avoiding adverse effects.
BMP 5-8	Pesticide Application According to Label Directions and Applicable Legal Requirements
	Label directions would be followed on all herbicides, dyes, colorants, and adjuvants. Label directions would be followed for application rates, mixing, application methods, rinsing, and disposal of containers. All herbicide applications would follow applicable state laws and California EPA regulations, including safety regulations. All Forest Service personnel in charge of herbicide application would be certified as a Qualified Applicator (Certificate). All contract applicators would be appropriately licensed by the state. These actions would effectively avoid the misuse of the herbicides used in this project and thus decrease the risk of contaminating water or non-target areas.
BMP 5-9	Pesticide Application Monitoring and Evaluation
	Soil, ground water, and water monitoring plans have been developed for this project. These plans would be implemented prior to application to determine baseline conditions. The Soil, Ground Water, and Water Quality Monitoring Plans are located in appendix F of this EIS. The forest hydrologist, soil scientist, and silviculturist would evaluate the results of the monitoring. This monitoring would determine if herbicides have moved off-site into water after application, through overland flow, leaching, or substrate flow and would determine the amount of herbicide residue reaching water. Additional protection measures would be implemented if needed. Post-project monitoring (DFPZ) would determine the effectiveness of treatment in meeting the project objectives. The DFPZ Monitoring Strategy is located in appendix F of this EIS.
BMP 5-10	Pesticide Spill Contingency Planning
	A Spill Plan would be prepared for this project that details containment and notification measures should a spill occur. If a spill occurs, action would be taken immediately by the contractor to contain the spill. The contractor would notify the Contracting Officer, Representative or Forest Dispatcher immediately. These actions would reduce the risk of contamination of water by accidental herbicide spills.
BMP 5-11	Cleaning and Disposal of Pesticide Containers
	All herbicide and adjuvant containers would be triple rinsed, with clean water, at a site approved by the Contracting Officer or Representative. Used containers would be punctured on the top and bottom to render them unusable, unless said containers are part of a manufacturer's container recycling program, in which case the manufacturer's instructions would be followed. Disposal of non-recycled containers would be at legal dump sites. Equipment would not be cleaned in a manner that allows contaminated water to enter any body of water on the national forest. These actions would effectively prevent water contamination and risk to humans from herbicide containers.
BMP 5-12	Streamside Wet Area Protection During Pesticide Spraying
	To minimize the risk of herbicides inadvertently entering waters or unintentionally altering the riparian area, streamside buffer zones (table F-4) would be established adjacent to surface water, riparian areas, stream channels, or wetlands. SAT Guidelines Table 5-4 (also HFQLG FRA FEIS Table 2.15) defines how to delineate interim boundaries of RHCAs for different water bodies on the Lassen, Plumas, and Tahoe National Forests. These guidelines are included in the Streamside Management Zone Plan (Appendix A of the Slapjack Hydrology Report), and would be used to define no-spray areas for herbicide application for DFPZ maintenance, as follows: For natural stands, herbicide applications for DFPZ maintenance would be limited to areas outside of the riparian buffers as defined in the SAT guidelines.

	For plantations, DFPZ construction would be allowed within the RHCAs. However, herbicide applications for DFPZ maintenance would be restricted to areas outside RHCA's as defined by SAT guidelines. For ephemeral swales where buffers for mechanical activity during DFPZ construction were established, no herbicide application buffers will be applied. Application would be limited to dry periods of the year, as defined below for noxious weed eradication. For noxious weed control projects that would enhance riparian habitat conservation objectives, herbicide applications may be allowed within the RHCAs and application limitations will be determined as follows: 50 Feet - Perennial Streams 50 Feet – Flowing Intermittent and Ephemeral Streams during the wet season 0 Feet – Dry Intermittent and Ephemeral Streams during the dry season (August and September
BMP 5-13	Controlling Pesticide Drift During Spray Application
	To reduce off-site and off-target drift, environmental factors must be addressed when developing the project proposal and contract language. The spray application of herbicides would be accomplished according to a prescription which accounts for terrain, and that specifies the following: spray exclusion areas, buffer areas, and factors such as formulation, equipment, droplet size, spray height, application pattern, flow rate, and the limiting factors of wind speed and direction, temperature, and relative humidity. If the following weather parameters are exceeded then herbicide applications would cease: A. Sustained wind velocity exceeding 5 miles per hour. B. Raining or rain imminent. C. Air temperature exceeding 85 degrees Fahrenheit if the labels requires it or to prevent worker heat stress. D. Temperature inversions that could lead to off-site movement of herbicide spray.

Table F-3. Management requirements for herbicide use related to worker and public safety (alternatives B, D, E, and F).

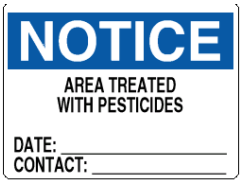
1	Require the use of coveralls by all contract workers in addition to PPE required by product label, when handling herbicides or adjuvants, including loading, mixing, application, and disposal of containers.
2	All Forest Service workers (such as inspectors) are required to: meet the Federal Worker Protection Standard and State regulations; wear coveralls; use personal protective clothing required by product labels: wash their clothes daily; and change clothes when not on the project site.
3	Provide clean water and soap for routine washing of hands and face and for emergency washing per State regulations.
4	Restrict worker access into units following label directions (restricted entry interval). In general, worker access to the treated areas is restricted until after the spray solution has dried and the following restricted entry intervals for specific pesticides: Imazapyr REI = 12 hours. Triclopyr REI = 12 hours.
5	Post weatherproof pesticide warning signs at areas of common public access that alert the public that herbicide application is taking place, as required by State regulations (California Code of Regulations; Division 6. Pesticides and Pest Control Operations; 6776. Field Postings). Information to be posted on the pesticide warning signs include: Pesticide applied, Date of application, and the date the restricted entry interval expires. The signs shall: a) Be posted before the application begins but shall not be posted unless a pesticide application is scheduled within the next 24 hours; b) Remain posted and clearly legible throughout the application and the restricted entry interval; and c) The signs would be removed 3 days after the end of the restricted entry interval. Sample pesticide warning sign: 
6	A general public notice sign would be posted after the removal of the pesticide warning sign to inform potential forest users that the area has been treated with pesticides. Information that would be posted on the public notice sign includes: date of pesticide application and contact phone number. The sign would remain posted for approximately threes months after pesticide application. This should be sufficient time for herbicide-treated vegetation to exhibit signs of chlorosis and tissue necrosis (leaf discoloration – yellow to brown) and eventual death. Sample public notice sign. 

Table F-4. Buffer width designations for herbicide use, by resource. Buffers would be applied under alternatives B, D, E, and F.

Buffer Width	Resource
500 feet	Around known occupied amphibian Threatened, Endangered or Sensitive species site, such as California red-legged frog, Mountain yellow legged frog, Foothill yellow legged-frog, Cascade frog and Northern leopard frog (HFQLG FEIS; SNFPA FS EIS ROD, page 63)
300 feet	Perennial streams and ephemerals within the sub-watershed of a known California red-legged frog. On perennial streams or ponds for reptiles under Threatened, Endangered or Sensitive species. (HFQLG FSEIS chapter 3 page 230). On aquatic features (lakes, meadows, bogs, fens, wetlands, vernal pools) following RCA widths for aquatic and riparian associated species (HFQLG Act FSEIS BA/BE).
100 feet	Known Native American Gathering Sites (CDPR 2001) Botanical Threatened and Endangered Species
50 feet	Archaeology: Pre-Historic and Historic Sites Botanical Sensitive Species Property Boundary – Private
25 feet	25 feet - Property Boundary – Commercial, State, Federal 25 feet – Buffer around designated PACs, SOHAs, Territories, Den sites or Bat roosts of Threatened, Endangered, or Sensitive Species (i.e. PACs buffer 300 feet + 25 feet) (HFQLG Act FSEIS BA/BE).
	Buffer widths are based on the following: • 25 feet Buffer – SERA Risk Assessment for Imazapyr (page 4-14) predicts drift of 23 feet from 5 mph winds and 68 feet for 15 mph winds. • 50 feet Buffer – Minimal drift. Would not adversely affect resource. • 70 feet Buffer – Offsite movement occurred mostly within 70 feet (California Department of Pesticide Regulation Study).

Monitoring Strategy for the Slapjack Project

Two stages of monitoring are discussed in this appendix: implementation and effectiveness. Implementation monitoring determines the degree and extent to which application of standards and guidelines and mitigation measures meets management direction and intent. Effectiveness monitoring is used to determine the degree to which implemented resource management activities met objectives. The effectiveness of standards, guidelines, or mitigations cannot be assessed without first confirming that those standards and guidelines were actually implemented. Information from monitoring will help guide future activities and/or adjust current management practices.

Overall goals of monitoring activities will be to

1. Provide information useful to managers applying the principles of adaptive management.

2. Assist the public in gauging the success of implementing the resource management activities as designed.

3. Assess the effectiveness of the resource management activities in achieving resource objectives.

The following monitoring activities address the purpose and need of the Slapjack Project. In order to do so, post-implementation assessment will be project specific. In addition, programmatic HFQLG monitoring will occur concurrently (HFQLG final EIS 1999), testing the effectiveness of the entire *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act) Pilot Project, of which the Slapjack Project is only one project. Since the main HFQLG monitoring sites are determined randomly, it is not known yet how many of these sites will be included in the Slapjack Project area. The following efforts will take place during project implementation and after completion of project activities.

Botanical Resources Monitoring

Implementation Monitoring

Implementation monitoring will begin in the year following project implementation. The objective will be to answer the following two questions from the HFQLG Monitoring Plan (1999):

- Were Threatened, Endangered, and Sensitive (TES) plants surveyed and protected?
- Were noxious weed introductions prevented and existing infestations suppressed?

Effectiveness Monitoring

Effectiveness monitoring will begin three years after project implementation. The objective will be to answer the following four questions from the HFQLG Monitoring Plan (1999):

- How do TES plant species respond to resource management activities? Randomly selected units without TES plants will also be selected to determine if any new TES plant occurrences have occurred in response to management activities.
- Were existing infestations of noxious weeds eliminated or contained?
- Were all new infestations of noxious weeds eliminated or did some become established?
- Did new infestations of noxious weeds occur during or following project implementation?

A sample pool of botanical sites will be developed to address each of the above questions. The number of sites in each sample pool would be limited to 30, and if that limit is exceeded, then the sites to be monitored will be chosen randomly. If the limit is not reached, then every site in the pool will be monitored. The monitoring will be done by forest service botanists who will conduct field visits, and record and analyze the results.

Sampling will consist of photo plots established to monitor mastication, thinning, and prescribed fire in areas with botanical concerns. These will be established with fuels and botany personnel and reread jointly.

This monitoring plan follows the direction of the HFQLG Act. Monitoring requirements are detailed in chapter 6, Monitoring Strategy, of the HFQLG Act final environmental impact statement (EIS).

Implementation Monitoring for Canopy Cover Retention

Canopy cover (CC) plays a vital role in ecosystem processes and wildlife habitat. The HFQLG standard and guidelines require specific CC management objectives. A CC implementation monitoring program will address the needs for guiding adaptive management action. CC monitoring will attend to the following concerns and needs:

- CC will be measured during project implementation (sale administrator or harvest inspector) to confirm a minimum of 40 percent CC in Defensible Fuel Profile Zones (DFPZs) (CWHR size classes 5M, 5D, and 6) and 50 percent CC in individual tree selection areas (CWHR size classes 4D, 4M, 5D, 5M, and 6).

- Provide information useful to managers applying the principles of adaptive management.

- Assess the effectiveness of silvicultural activities in achieving CC objectives.

CC sampling will be done using the GRS densitometer. This common CC sampling tool is also used by the California Department of Fish and Game. Since Forest Service management direction measures wildlife in terms of CWHR specifications set by the California Department of Fish and Game, application of the densitometer will lend to overall consistency in management.

Depending upon the size of the area being surveyed, the number of sample points may vary. The goal of sampling will be to cover an area thoroughly without over-sampling. CC will be calculated using the following formula:

(canopy hits / sample points) × 100 = percent canopy cover

where:

"canopy hits" is the vertical interception of crown cover with the crosshairs as viewed through the densitometer.

Defensible Fuel Profile Zone Monitoring

A. Forestwide DFPZ Monitoring

The HFQLG Act final supplemental EIS Record of Decision (pages 13–14) outlines the monitoring strategy for the HFQLG Pilot Project. This monitoring strategy will apply to all DFPZ maintenance projects, so no additional monitoring strategies would be required (page 3).

B. Project-level DFPZ Monitoring

DFPZ monitoring will not begin for about 5 years after construction has been completed, depending upon funding (see "C. No DFPZ Maintenance" under the "DFPZ Maintenance" section below), because DFPZ effectiveness will not be seriously reduced for approximately 5 to 10 years in plantations and 10 to 20 years in natural stands.

A DFPZ monitoring program will be completed at 2- to 3-year intervals for the Slapjack Project area until the DFPZ is no longer needed or funding is no longer available (see "B. Long-Term (Future) DFPZ Maintenance" under the "DFPZ Maintenance" section below). The Forest Service will fully comply with

the Council on Environmental Quality (CEQ) regulations for implementing the *National Environmental Policy Act* requirements prior to conducting any maintenance activities.

C. DFPZ Site-Specific Monitoring Criteria

The objectives for DFPZs include retaining surface fuels less than 3 inches in diameter and around 5 tons per acre and retaining large down woody material, where available, at 10 to 15 tons per acre, after treatment.

When both surface fuels (needles, twigs, branches) and fuel ladders (shrubs, brush, understory trees) exceed predetermined levels (see table F-1), then DFPZ maintenance treatments may be evaluated and scheduled (see "Short- or Long-Term DFPZ Maintenance" under the "DFPZ Maintenance" section below) on a site-specific basis. The priorities for DFPZ treatment are (1) stands that meet both surface fuels and fuel ladder criteria, (2) stands that meet the surface fuel criteria, and (3) stands that meet the fuel ladder criteria.

Table F-5. DFPZ monitoring criteria.

Surface Fuels	Treat If Surface Fuels Exceeds:	Retain After Treatment
0–3 inch diameter	Greater than (>) 7 tons per acre	Around 5 tons per acre
Large down wood	> 15 tons per acre	10–15 tons per acre
Fuel Ladder	**Treat if Fuel Ladder Exceeds:**	**Fuel Height**
Shrubs/brush	> 25 percent ground cover	> 5 feet
Understory trees	> 15 percent canopy cover	> 8 feet

Implementation and Effectiveness Monitoring for Prescribed Fire

Photo plot implementation and effectiveness monitoring

Some plots will be placed in RHCAs and near areas of special botanical resource concern. The remaining plots will be placed in random areas in units with high fuel loading to show fire behavior, consumption, and retention. Plots will also be established in random units throughout the DFPZ to show effectiveness of all the different fuel treatments and mastication. Different treatments include, thinning /underburn, handcut/pile and burn.

The Fuels Officer will determine the photo plot location before burn plan development. GPS will be used to mark and establish plots for photo monitoring. Photos will be taken as the flaming front is passing through the plot area. Different angles might be taken to best illustrate fire behavior. Plots will be revisited one to two days after ignition to compare and contrast consumption and scorch. Revisits to plots will occur one, three, and five years after ignition. Photos will be taken to illustrate scorch, mortality, and regeneration.

Features that will be recorded with photos:

1. Pre-burn – to show existing fuel conditions.
2. Photos during ignition - to show fire intensity/behavior.
3. Postburn – taken 1-2 days post ignition to show burn accomplishments (consumption, scorch).

4. Postburn – taken 1, 3, 5 years post ignition to show accomplishments and effects of fire behavior. (scorch, mortality, regeneration).

Heritage Resources Monitoring

Monitoring during project implementation, in conjunction with other measures, may be used to enhance the effectiveness of the protection measures summarized below.

- All proposed activities, facilities, improvements, and disturbances shall avoid heritage resource sites. Avoidance means that no activities associated with the project that may affect heritage resource sites shall occur within a site's boundaries, including any defined buffer zones. Portions of the project may need to be modified, redesigned, or eliminated to properly avoid heritage resource sites.

- All heritage resource sites within the area of potential effect shall be clearly delineated prior to implementing any associated activities that have the potential to affect heritage resource sites.

- Buffer zones may be established to ensure added protection where the Forest or District Archaeologist determines that they are necessary. The size of buffer zones needs to be determined by the Forest or District Archaeologist on a case-by-case basis.

- When any changes in proposed activities are necessary to avoid heritage resource sites (e.g., project modifications), these changes shall be completed prior to initiating any activities.

Roads and Logging Systems Monitoring

This monitoring plan follows the direction of HFQLG final EIS. Monitoring implementation and effectiveness requirements are detailed in Chapter 6, Monitoring Strategy. Logging Systems activities fall under the Best Management Practices Evaluation Process.

The goals of this monitoring plan are as follows:

1. Collect information to help guide future harvest implementation and adjust current management requirements, if needed.

2. Assist the public in gauging the success of Forest Service management requirements in reducing the erosion impacts to the environment.

3. Assess the effectiveness of resource planning to achieve minimal soil erosion.

Implementation monitoring measures the degree or extent the standard management requirements meet the specified direction. Best Management Practices (BMPs) and "B" and "C" timber sale contract provisions are the mitigation requirement tools used to ensure soil erosion is kept to a minimum. BMP standards for implementation are to be compared to on-the-ground results with an ultimate objective of 100 percent attainment. Results for any BMP that fall below 85 percent will trigger an activity review. The items to be evaluated for Logging Systems are as follows:

1. SMZs = BMPs 1.8 and 1.19.
2. Skid Trails = BMPs 1.9, 1.10, 1.11, 1.12, 1.13, 1.17, 1.20 and 1.21.
3. Landings = BMPs 1.12, 1.13, 1.14, 1.16, 1.20 and 1.21.
4. Temporary Roads = BMPs 1.13, 1.14, 1.20 and 1.21.
5. Road Decommissioning = BMP 2.26.

Effectiveness monitoring measures the degree to which the resource activities (harvesting near Streamside Management Zones (SMZs), building or using existing skid trails, landings, temporary roads and road decommissioning) will meet the BMP erosion control features. The tilling machine that travels over the top of the constructed water bars can seriously affect the long term effectiveness. Water bars need to be constructed to a height sufficient to survive the tilling process and still function properly.

Locations and Frequency: At the implementation monitoring stage, a random sample of units will be developed at the end of each year. From these samples, a representative number of units will be selected for evaluation.

At the effectiveness monitoring stage, an assessment will follow one to three years behind the implementation monitoring at the same site location to assure the erosion control features will continue to function for the long term.

Monitoring for Cumulative Watershed Effects

Implementation and effectiveness monitoring for cumulative watershed effects are currently accomplished through the Best Management Practice Effectiveness Evaluation Process.

Sampling Design

Sites to be evaluated are identified by random or non-random sampling selection procedures. The random selection process for monitored sites involves looking at projects in the Feather River Ranger District. Within the selected project, randomly selected units that meet certain issues deemed appropriate by the hydrologist are then designated for monitoring. If the unit does not require monitoring, another is chosen within the project area. Randomly identified sites are very important for drawing statistical conclusions on the implementation and effectiveness of BMPs. Non-randomly selected sites allow for direct monitoring of management practice effectiveness within an area that may have an elevated level of Threshold of Concern. Non-random selected sites are clearly identified and kept separate from the randomly selected sites by the Forest Hydrologist during data storage and analysis.

Non-random selected sites are identified in various ways:

- Identified as part of a monitoring plan prescribed in an environmental assessment, environmental impact statement, or a land and resource management plan.
- Identified as part of a settlement or negotiated agreement.
- Part of a routine site visit.

- Sites that are of particular interest to site administrators, specialist and/or management due to their sensitivity, uniqueness, and so forth.

- Selected for a particular reason specific to local needs.

Wildlife Adaptive Management and Monitoring

Implementation monitoring will occur in a prescribed light underburn in a Protected Activity Center (PAC) and a Spotted Owl Habitat Area (SOHA). Effectiveness monitoring will examine the ability of fire and resource managers to predict the outcome of fire-related effects and will enable land management agencies to more predictably apply prescribed natural fire as a tool to enhance owl habitat.

Monitoring will occur by (1) surveys to protocol the following year to confirm any single/pair detections and/or reproductive success – measure of success is rated by how habitat changes caused by the underburn affected owl productivity; (2) field reviews and photo points of the area to compare and evaluate light underburn – measure of success is through photo comparison; (3) drawing conclusions from the relationship between reproductive success and implementation of the treatment.

The monitoring frequency will be (1) visual monitoring at the time of treatment, (2) field surveys for owl presence the following year, (3) productivity and owl use over a three-year period.

Herbicide Monitoring

Draft herbicide monitoring plans have been developed for surface water and streambeds, groundwater, and soil. The draft monitoring plans represent protocols that will be followed if alternatives are chosen that include herbicide application. If such alternatives are adopted for the project, detailed monitoring plans based on these protocols will be developed.

Surface Water and Streambed Monitoring Plan

Since 1988, water quality monitoring has been required for all projects, which include the use of herbicides in Forest Service Region 5. In that year, the Region adopted the Final Environmental Impact Statement: Vegetation Management for Reforestation (1988) and the Record of Decision, which required the monitoring.

The treated area could be as large as 1,989 acres and could be carried out for up to five years. If any action alternative that proposes the use of any herbicide is approved, a site-specific monitoring plan amendment will be prepared each year by the water-quality monitoring specialist. It will specify units and streams to be monitored and will give a schedule of monitoring by herbicide.

The overall objective of this plan is to assess the effectiveness of project BMPs and other mitigations in protecting beneficial uses of water in and downstream of the project area. Specific objectives are to

1. determine if an applied herbicide has moved off-site into water through overland flow, leaching through the soil into groundwater, or attached to sediments;

2. determine the amount of herbicide residue reaching water;

3. determine if herbicide residue has entered the water, to determine how long it continues to enter the water;

4. assess project compliance with state of California water quality standards as described in the Central Valley Regional Water Quality Control Board Basin Plan (CVRWQCB 1989).

This monitoring plan assumes that all mitigation measures outlined in the EIS, including streamside and riparian buffers and Limited Operating Periods, will be followed. These measures have been designed based on data gathered on similar projects on other National Forests in California. The intent of the design is to ensure extremely high confidence levels that no herbicide residues will be detected in the water.

Beneficial uses of water that could be potentially impacted by this project are identified in the EIS in both the "Soils" and "Hydrology" sections in chapter 3. Because stream classes are based on beneficial uses of water, and generally correspond to flow conditions and size of channel, selection of highest priorities for monitoring purposes will use those criteria. The priorities in table F-3 will be used to select monitoring locations:

Table F-6. Priorities for monitoring locations.

Priority	Stream Class	Description	Beneficial Uses	Treatment
I (Highest)	Class 1	Perennial	Domestic, Fishery	Imazapyr
II	Class 1	Perennial	Domestic, Fishery	Triclopyr
III	Class 2-3	Intermittent or ephemeral	Aquatic life, Non-contact Recreation	Imazapyr
IV	Class 2-3	Intermittent or ephemeral	Aquatic life, Non-contact Recreation	Triclopyr

Because one of the purposes of monitoring is to test the effectiveness of BMPs, including stream protection buffers, the prioritization of units should not consider the effective distance of the actual sprayed area from the water body. The ranking is only based on whether a unit includes or is proximal to surface water, springs, or wells. The assignment of priorities is for the purpose of allocating monitoring resources and is not a statement of any actual probability of herbicides reaching water. A minimal number of monitoring stations will be selected regardless of the number of units falling into the higher priority categories.

The majority of monitoring stations will be located on perennial or intermittent, first or second-order streams draining not more than 1,000 acres. Average base (summer) flow will be less than 1 cubic foot per second. The drainage area upslope of the sample station will generally contain at least 25 percent treated area for DFPZ units. These guidelines are intended to limit the distance downstream from the treated area that most sampling stations will be located. A limited number of downstream monitoring stations will also be established to monitor for cumulative effects and as a realistic test of compliance with numerical water quality criteria.

Each monitoring point will be identified on the ground with a code number. Each station location will be recorded using a code number on a USGS Quadrangle or similar map. The monitoring location maps will be kept on file by the water-quality monitoring manager at the Feather River District Office and become part of the project file. For each station, the project file will also include a narrative description of the exact station location, the units monitored, the herbicides monitored, and documentation of all samples collected. Because of

security concerns, the information in this project file will not be made available to the general public until after the monitoring for each year's project is complete, in order to protect the integrity of the data. This stipulation has been part of the Region 5 Water Quality Monitoring Plans for herbicide projects since 1990.

Early warning monitoring will not be necessary for this project because the following measures will be taken to reduce the probability of herbicides entering water during application: (1) herbicide application will be by backpack sprayers or other ground-based methods and will be under restricted weather conditions to minimize drift; (2) colorant will be added to the spray formulation to track drift; and (3) untreated buffer strips will be established between surface water and treatment units.

Surface water and streambed sediment samples will be collected before and after herbicide application. Pretreatment samples will serve as control samples. The timing of post-treatment samples will be determined by storm events and snowmelt runoff periods. Sampling frequency for each location will depend on the herbicide monitored and time of application.

Personnel trained in sample collection by an experienced sample collector will collect samples. Sample collectors will not have been involved in herbicide application within two weeks of the event that triggers sample collection. Extreme care will be taken to prevent sample contamination. The collectors will not have any herbicide or other contaminant on clothing, hands, or boots. Sample containers will not be transported or stored with herbicides or herbicide application equipment or in vehicles used to transport the herbicides. A sample documentation form will be filled out at each collection station. Each sample bottle will be clearly identified as follows: (1) monitoring station ID number; (2) date and time of sample collection; (3) name of person collecting sample; (4) sample matrix; and (5) herbicide to be analyzed. This information as well as weather conditions and an estimate of stream discharge will also be recorded on the form, which will be kept in the project file.

After collection, the monitoring manager, who will coordinate transport to the laboratory, will receive samples. Samples will be transported in an ice-filled cooler and delivered to the laboratory within 72 hours of collection. A chain of custody form will accompany each sample.

Water samples will be collected so as to be representative of the total volume of water passing the monitoring station at any moment. Samples will be collected at the lower end of a straight riffle section of channel near the fastest moving portion of the stream at a time when the runoff from treated areas is expected to pass the station. Sample locations may be sited to facilitate access during winter conditions as necessary.

In past herbicide monitoring in Region 5, composite sampling has not been shown to be more effective in detecting herbicide residues than the simpler grab sampling. It has not been shown that the added expense, opportunities for contamination, and risk to personnel is justified for composite sampling. Therefore, all samples will be 1-liter grab samples.

Streambed sediments will be sampled to monitor for possible herbicide accumulations and cumulative watershed effects. Streambed deposits can act as a chemical sink as herbicide residue in the water adsorbs to suspended sediments or sediment particles. This herbicide residue can go undetected by sampling water above the streambed.

Streambed sediment samples will be collected following the first runoff-producing event after application. A composite sample of approximately 50 grams of fine material will be collected, if present, in the surface 1 cm (centimeter) from depositional areas. These areas will be in the stream channel near where the water samples

are collected. It is not practicable to collect sediment if sufficient quantities of fine sediments are not present over a reasonably contiguous section of the stream. If there is no suitable location near a sampling station to collect a sediment sample, no sample will be collected. The monitoring specialist may assign an alternative sediment sampling location if there is no suitable location close to the water monitoring station. If a sample contains herbicide residue, additional samples will be collected as discussed above.

Public involvement will be an important part of the monitoring plan. Public involvement objectives are to provide an open and informative monitoring process and to promote trust and understanding of project implementation and progress. A format will be developed to invite public comment and input regarding the monitoring protocol and results, and to present monitoring results in a timely and transparent manner.

A California state-certified laboratory using methods developed and approved by the California Department of Food and Agriculture, the U.S. Food and Drug Administration, or the U.S. Environmental Protection Agency will analyze samples. The laboratory may use methods developed for analysis of drinking water or wastewater, but should do so in consultation with the monitoring manager, and must report the method used. Detection limits for the various herbicides will be included in the cost bid provided by the lab. Some flexibility may be allowed in detection limits, depending on the quality and volume of the sample provided. Sample containers will be provided by the analyzing laboratory, and will be certified as residue-free by the lab.

For quality assurance (QA), blank and spiked samples will be sent to the lab with selected sample batches. Because field samples are collected on an irregular schedule and often without prior notice, it may be unnecessarily difficult to provide blanks and spikes with every sample batch. The primary purpose of this QA program is to ensure the reliability of the lab's conduct, not to provide a statistical measure of the lab's accuracy. Before any samples are submitted, the lab will be notified that quality control (QC) samples may be submitted with any or all samples. Under no circumstances will the lab be informed when QC samples are included in a batch, and QC samples will not be identifiable by the lab.

To provide a measure of the lab's accuracy, the lab may be requested to provide its QC data sheets. These and a record of results from analysis of the submitted QC samples will be kept in the project record.

Spike samples or standard dilutions may be prepared by Forest Service personnel or purchased from an analytical lab. If purchased from a lab, they should not be submitted for quality control to the same lab. A qualified expert will train any Forest Service personnel preparing standards or QC samples in laboratory procedures. Excess standard solution should be disposed of properly, which, in the case of dilute herbicides, means used in a manner consistent with the approved purpose. A detailed record will be kept of the procedures followed in preparing all spikes, concentrations submitted to labs, and results reported by the labs.

The monitoring record discussed above will include maps, field notes, and all records of correspondence with the laboratory, organizations, groups, and individuals concerning results of the water and sediment monitoring. The monitoring station records will include the complete record of the sample station, remarks on any unusual occurrence that might affect water analysis results, and a description of the treatment units within the drainage area of the sample point. In addition, the water-monitoring file will include information by unit on the following:

1. Type of herbicide, formulation, and manufacturer.
2. Application formula and rate.

3. Method of application.

4. Weather conditions during spraying and monitoring.

As results of monitoring are received from the lab, the monitoring manager will notify the project manager of any results, which suggest changes in preventive measures are needed during project implementation.

An annual summary report will be prepared that will contain analysis results and a narrative of the effectiveness of the BMPs implemented in order to protect water quality. This report will be kept on file in the Feather River District Office and with the District Hydrologist. Copies will be sent to the California Central Valley Regional Water Quality Control Board and circulated to appropriate line officers and to any other person requesting the report.

Groundwater Monitoring Plan

The objective of groundwater monitoring is to meet the goal of protecting beneficial uses of water. Groundwater monitoring is required when herbicides that can be transported in solution are used. Groundwater monitoring is important to avoid aquifer contamination. The three objectives of groundwater monitoring include: (1) early warning of any contamination in order to warn potentially affected users in a timely manner; (2) detection of off-site migration of herbicides associated with uncertainty related to groundwater conditions and climatic events; and (3) determining the persistence of any potential contamination.

Beneficial uses of groundwater, including domestic water supplies and uses associated with natural discharge points such as springs and seeps and groundwater discharge to streams, will be evaluated. Monitoring will ensure that beneficial uses are protected above and beyond the protective and mitigation measures specified in the EIS, such as riparian buffers and limited operating periods.

It is unclear that either of the herbicides proposed for use (imazapyr and triclopyr) poses any substantial risk of groundwater contamination. Leaching potential for both chemicals under the conditions prevalent in the project area (soils with high clay content and high organic matter content) is described as low. Monitoring will be used to ensure the safety of application and negate any risk to beneficial uses and users.

Groundwater monitoring locations will be identified by a qualified geologist, and will be chosen based on the location of beneficial uses, the local hydrogeologic conditions, and the objectives described above. Monitoring wells constructed to meet the monitoring objectives and conditions and accepted standards for sampling will be installed. Pre-, during, and post-application sampling will be performed to establish baseline conditions, provide early warning as needed, and document any persistence and off-site migration. Post-treatment sampling will continue as determined by hydrogeology, climatic events and herbicide chemistry. Pre-treatment monitoring will determine if there is any existing herbicide load in groundwater, and help evaluate the possibility of cumulative effects.

Sample handling and analysis protocols will follow the procedures outlined for surface water monitoring.

Soil Monitoring Plan

The objectives of soil monitoring are parallel to those for surface water and groundwater monitoring, in order to protect beneficial uses. Herbicide retention in soils is of interest where erosion potential or leaching

potential may transport chemicals retained in soil to surface water bodies or ground water and potentially impact beneficial uses of water. Soil monitoring will be performed to ensure that beneficial uses are protected above and beyond the protective and mitigation measures specified in the EIS, such as riparian buffers and Limited Operating Periods. Specific soils that have a high potential for herbicide persistence or leaching will be targeted for monitoring. These will include soils with high surface clay percentage, sandy soils where herbicides will be likely to be mobile, and poorly or excessively drained soils near stream channels or other riparian features. The focus of soil monitoring would be persistence of imazapyr, since it can remain active in soil for long periods. However, since repeated application of triclopyr is proposed for noxious weed control, monitoring would be established for its presence where weed control with herbicides is proposed.

Soil sampling will include the litter layer where present and the surface 3 inches of soil. Pre-, and immediate post-treatment would be performed to determine baseline conditions and establish concentrations resulting from spraying. Follow-up sampling three or more months after application would be performed and repeated as needed to track any persistence.

Sample handling and analysis protocols will follow the procedures outlined for surface water monitoring. Clean core samplers that have not previously been in contact with herbicide or possibly contaminated soil will be used for each sample taken.

Appendix G

National Forest Management Act Findings for the Slapjack Project

Appendix G
National Forest Management Act
Findings for the Slapjack Project

V. FINDINGS REQUIRED BY OTHER LAWS AND REGULATIONS

Based on the analysis and prescriptions for stands in the Slapjack Project area, the following finding of facts pursuant to the National Forest Management Act (NFMA) (16 USC 1604), are as follows:

A. The minimum specific management requirements to be met in carrying out projects and activities for the National Forest System are set forth in this section. Under 16 U.S.C. 1604 (g)(3)(E) a Responsible Official may authorize project and activity decisions on NFS lands to harvest timber only where:

1. Soil, slope, or other watershed conditions will not be irreversibly damaged.

The Plumas National Forest Land and Resource Management Plan (LRMP) Forest-wide Standards and Guidelines as amended by Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLG FRA) and the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement Record of Decision (SNFPA FS EIS ROD) relating to soil cover, water quality, and riparian system protection, along with Scientific Assessment Team (SAT) guidelines and Best Management Practices (BMPs) would be implemented to protect and mitigate potential impacts to soil and water quality.

The District Hydrologist has determined through a Cumulative Watershed Effects (CWE) Analysis that no irreversible or irretrievable commitments of soils, riparian, or water resources are expected for any alternative (See Hydrology and Soils Reports).

2. There is assurance that such lands can be adequately restocked within five years after harvest.

All trees proposed for removal under the Slapjack Project would be by thinning from below for the DFPZs and individual tree selection or by group selection, which is an unevenage method.. Therefore, no regeneration harvests are proposed under this project. However, the areas proposed for harvest under group selections can be regenerated using standard reforestation techniques.

3. Protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat.

The Plumas National Forest Land and Resource Management Plan Forest-wide Standards and Guidelines as amended by Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLG FRA) and the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement Record of Decision (SNFPA FS EIS ROD) relating to soil cover, water quality, and riparian system protection, along with Scientific Assessment Team (SAT) guidelines and Best Management Practices

(BMPs) would be implemented to protect and mitigate potential impacts to soil and water quality.

4. The harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber.

Trees proposed for removal under this project are in segments of Defensible Fuel Profile Zones (DFPZs) called for by Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLG FRA) or in units that lend themselves to individual tree and group selection. The purpose of removing trees is to reduce ladder fuels and crown density. Harvest and treatment methods are used to implement this direction within the limits imposed by SNFPA FS EIS ROD. In those areas where trees are removed for commercial purposes, the primary silvicultural method is intermediate harvest (thinning from below) and utilizes ground-based equipment. In the units of group and individual tree selection a commercial sale is likely. Even aged management would give higher outputs and value, but is not proposed.

It is likely there would be an economic timber sale with this proposal, but there would also be a service contracts with an embedded timber sale. Wood products would be removed from the area for use in local mills or energy plants but not in the quantities anticipated with HFQLG FRA.

SNFPA FS EIS ROD standards and guides reduce opportunities for an economical return and produce nominal timber outputs. The various treatment methods and systems were prescribed to provide a viable method of meeting a wide variety of resource management objectives without optimizing one resource at the expense of another.

B. A Responsible Official may authorize project and activity decisions on NFS lands using clearcutting, seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an even-aged stand of timber as a cutting method only where:

Even-aged management would not be applied to the stands at this time.

1. For clearcutting, it is determined to be the optimum method, and for other such cuts it is determined to be appropriate, to meet the objectives and requirements of the relevant land management plan (16 U.S.C. 1604 (g)(3)(F)(i));

Group selection harvests (0.5 – 2.0 acres) are an uneven age management method and are allowed by SNFPA FS EIS ROD, Table 2, page 68.

2. The interdisciplinary review as determined by the Secretary has been completed and the potential environmental, biological, esthetic, engineering, and economic impacts on each advertised sale area have been assessed, as well as the consistency of the sale with the multiple use of the general area (16 U.S.C. 1604 (g)(3)(F)(ii));

The ID team used a systematic, interdisciplinary approach to analyze the affected area and estimate the environmental effects. The analysis included input through public involvement. The ID analysis was based on LRMP direction, as amended by HFQLG FRA and SNFPA FS EIS ROD of 2004.

3. **Cut blocks, patches, or strips are shaped and blended to the extent practicable with the natural terrain (16 U.S.C. 1604 (g)(3)(F)(iii));**

   Even-aged management would not be applied to the stands at this time. However, group selection areas are dispersed, and the shapes are, indeed, naturally appearing.

4. **There are established according to geographic areas, forest types, or other suitable classifications the maximum size limits for areas to be cut in one harvest operation, including provision to exceed the established limits after appropriate public notice and review by the responsible Forest Service officer one level above the Forest Service officer who normally would approve the harvest proposal; provided, that such limits shall not apply to the size of areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm (16 U.S.C. 1604 (g)(3)(F)(iv)); and**

   The Slapjack Project is designed to fulfill the management direction specified in the Plumas National Forest Land and Resource Management Plan, as amended by the HFQLG ROD (1999) and the SNFPA FS EIS ROD (January 21, 2004).

   To implement group selection harvest from 0.5 to 2.0 acres in size, as directed in the HFQLG Act (Section 401 (b) (1) and (d) (2)) and the HFQLG Forest Plan Amendment, to test the effectiveness of an uneven-aged silvicultural system in achieving an all-aged, multi-story, fire resilient forest; provide an adequate timber supply that contributes to the economic stability of rural communities; and promote ecological health of the forest.

   The HFQLG Forest Recovery Act specifies treating annually 0.57% of the pilot project acreage with group selection harvests. In Appendix E – Group Selection Analysis in the HFQLG EIS there is a calculation of 8,700 acres being treated annually over the pilot project land base. The proposed group selection harvests (219 acres) are within the calculated 20-year re-entry levels (1228 acres) of group selection targets for the Slapjack Project area.

5. **Such cuts are carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and esthetic resources, and the regeneration of the timber resource (16 U.S.C. 1604 (g)(3)(F)(v)).**

   No harvest cuts are designed to regenerate even-aged stands. However, soil, watershed, fish and wildlife, recreation, and aesthetic resources would be protected. Also, as stated above all areas can be regenerated using standard methods.

6. **Under 16 U.S.C. 1604 (m) even-aged stands of trees scheduled for regeneration harvest generally have reached culmination of mean annual increment of growth, unless the purpose of the timber cutting is excepted in the land management plan (FSM 1921.17f).**

   Even-aged management would not be applied to the stands at this time. Group selection harvests (0.5 – 2.0 acres) are an uneven age management method.